



Weatherford®

Fishing Services Catalog



MillSmartSM technologies featuring CustomCutTM inserts—because each job is different

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Introduction

Weatherford International Ltd. is the world's fourth largest diversified upstream oilfield service company and a global provider of innovative mechanical solutions, technology and services that span the drilling, completion, production and intervention cycles of oil and natural gas. We have been in business for more than 55 years and are known for the quality of our products and service, our dedication to safety and our commitment to development of our human capital. Headquartered in Houston, Texas, Weatherford employs more than 29,000 people worldwide, operating out of 540 locations in approximately 100 countries.

Industry-Leading Testing, R&D and Training Facilities

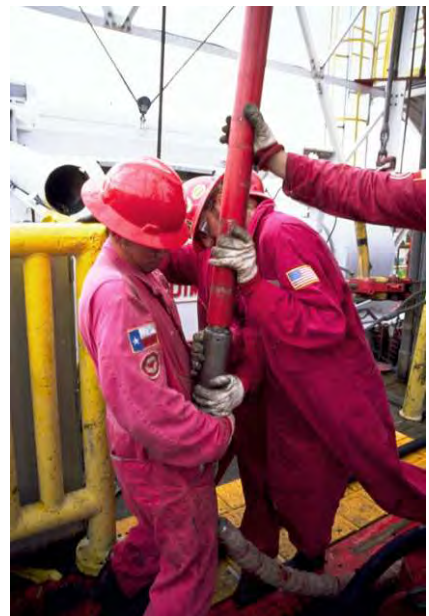
Weatherford has two of the industry's largest research-and-development (R&D), testing and training facilities in the world. Our Houston-based Technology & Training Center houses the world's most advanced safety valve engineering lab and three hot cells that simulate downhole conditions, including temperatures of up to 500°F (260°C). Our Downhole Technology Ltd. (DTL) Centre, in Aberdeen, is Europe's foremost research, testing and development center for offshore well services. It includes two fully operational drilling rigs, test boreholes, well intervention center and the market-leading RigTrain® training facility.

Engineering Depth

Weatherford's product engineering resources are based around the world. We also employ a range of engineers, designers and technical support staff whose breadth and depth of experience includes mechanical and electrical engineering to highly specialized disciplines of optical science and metallurgy.

Manufacturing Infrastructure

Weatherford's 84 certified manufacturing facilities are strategically located throughout the United States, Canada, South America, Europe and Asia. Since 2002 we have doubled our completions manufacturing capacity by adding new facilities, expanding existing ones, and investing significantly in the latest machining equipment. We put all of our manufacturing employees through internal apprenticeships and external training programs to ensure the highest level of quality control.



Introduction

Enterprise Excellence Program

Weatherford's Enterprise Excellence Program (EEP) represents a global initiative to create a preventative culture with error-free performance in all aspects of our operations. The ultimate benefit to our clients is reduced nonconformance in delivery of products and services, which means greater efficiency, higher performance levels and long-term value. This focus on excellence also breeds increased discipline in capturing your requirements before, during and after installation.



QHSE

Weatherford provides premium-quality products and services without compromising the health and safety of its workforce or its clients. Committed to protecting the integrity of all our resources, we strictly comply with all safety and environmental laws and regulations. Health and safety are top priorities of a company-wide policy that is strictly enforced. We continually seek and adopt work practices, services and materials to promote a safe and environmentally responsible work environment.

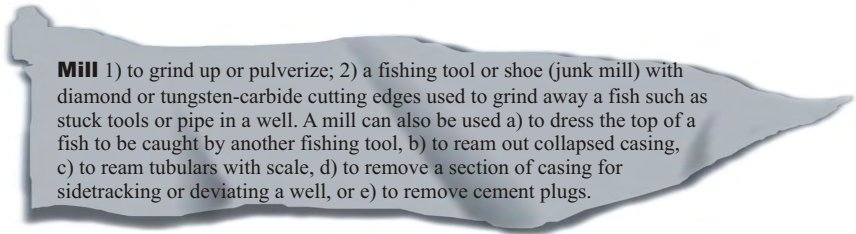


Weatherford® Fishing Services

Weatherford is the world's largest provider of fishing services, combining a tradition of superior service and diversity of product offering. We carry the industry's most comprehensive line of fishing, milling, casing and tubing patches, and abandonment tools. Located in most petroleum provinces around the world, we offer our clients the right tools, highly trained and experienced personnel, service quality second to none, and a strong commitment to quality, health, safety and the environment (QHSE).

A Focus on Technology

Weatherford's MillSmart™ milling technology is an engineered approach to milling that encompasses a wide range of proven products, services and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services. *MillSmart* technology is based on a tremendous amount of milling data gathered by Weatherford's worldwide Performance Tracking System and used to create best practices for almost every imaginable application.



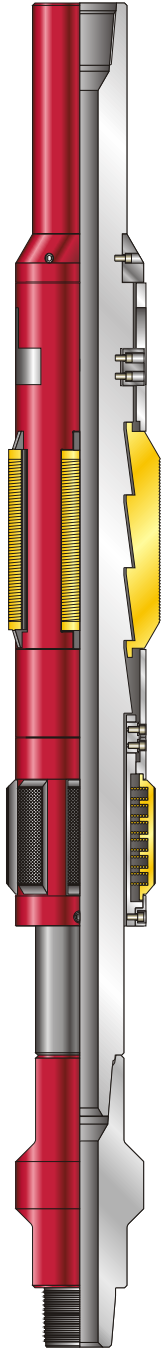
Mill 1) to grind up or pulverize; 2) a fishing tool or shoe (junk mill) with diamond or tungsten-carbide cutting edges used to grind away a fish such as stuck tools or pipe in a well. A mill can also be used a) to dress the top of a fish to be caught by another fishing tool, b) to ream out collapsed casing, c) to ream tubulars with scale, d) to remove a section of casing for sidetracking or deviating a well, or e) to remove cement plugs.

— Excerpt from the *Dictionary of Petroleum Exploration, Drilling & Production*
Norman J. Hyne, Ph.D.

Fishing Products and Services

- Abandonment
- Back-off tools
- Bumper sub
- Bushings
- Casing jacks
- Casing scrapers
- Cutters
- External catch
- Impression blocks
- Intensifiers
- Internal catch
- Jars
- Joints
- Junk baskets
- Keyseat wipers
- Magnets
- Mills
- Pulling tools
- Stabilizers
- Subs
- Subsidence tools
- Swivels
- Underreamers
- Washover equipment
- Well repair
- Wireline stripping kits

In-Line Casing Spear



Weatherford's in-line casing spear is used to retrieve 9 5/8- to 20-in. casing in cut-and-pull operations. The spear is designed to carry very high loads and to withstand jarring impacts, made possible because only the mandrel and the slips see the high loads applied when pulling on the fish. The spear can easily be dressed in the field for left- or right-hand release.

Features, Advantages and Benefits

- The slips and the mandrel have matching tapers to carry very high loads.
- The long slip contact area makes the spear easy to release and capable of withstanding high jarring impacts for long periods of time, saving rig time.
- Spear is set for either right- or left-hand release and can easily be changed in the field. Slips and drag blocks can be changed for alternate casing sizes while the tool is on the work string. Both of these features provide operational flexibility and efficiency and reduce rental tool costs.

Specifications

Casing Spear OD (in./mm)	Casing ID Catch Range (in./mm)
8.250 209.550	8.400 to 10.586 213.360 to 268.884
10.500 266.700	10.625 to 12.906 269.875 to 327.812
14.000 355.600	14.188 to 19.124 360.375 to 485.750

A-1 M23-24 Casing Cutter

Weatherford's hydraulically actuated A1 M23 and M24 casing cutters cleanly cut a wide range of casing sizes and weights without special surface equipment, making them some of the most versatile and easy-to-operate tools of their kind. Cutting pipe of any size within range of the tool in use requires only a change of knife.

The rotary table, top drive, power swivel, or downhole motor can provide rotating power for these extremely rugged and efficient casing cutting tools. A1 cutters can be run directly on the drillpipe or with drill collars; however, Weatherford recommends limiting use of collars to applications for which additional weight is needed, such as cutting from a floating vessel.

Weatherford's A1 casing cutters are products of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

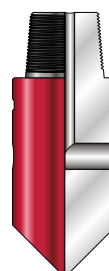
- Cleanly cut a wide range of casing sizes and weights without special surface equipment

Features, Advantages and Benefits

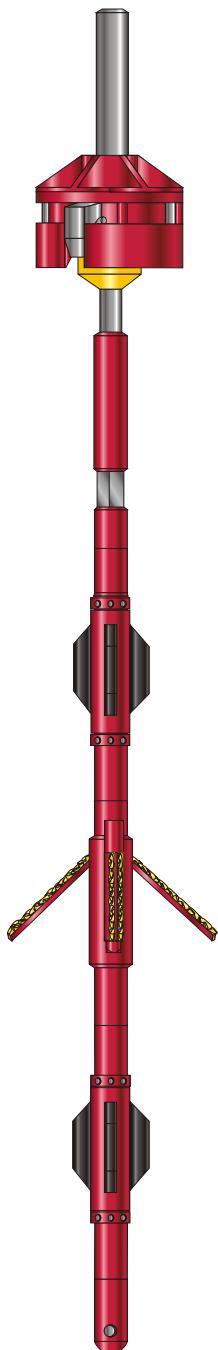
- A1 casing cutters require no special surface equipment. Simplicity and a minimum of working parts make these cutters efficient, versatile, and rugged.
- Hydraulic actuation makes these cutters efficient and easy to use.
- The exclusive indicator bushing triggers a distinct pressure drop, giving an obvious and unmistakable indication that the cut is complete.
- All principal parts are manufactured from special-quality, heat-treated alloy steel, which extends the tool life and keeps the tool intact under the toughest operating conditions. Inner parts are made from stainless steel for high corrosion resistance. Knives are dressed using Weatherford's MillSmart technology and the finest-quality tungsten carbide available, resulting in an outstanding reputation for milling performance.

Specifications

Casing Sizes (in./mm)	Body OD (in./mm)	Maximum Range		Assembly Number	
		Single String, Cutting from Center (in./mm)	Multiple Strings Cemented but Not Centralized, Cutting from Maximum Off-Center (in./mm)		
4-1/2 60.34	3-5/8 92.08	9-5/8 244.48	7 177.80	TT13350	—
5-1/2 73.03	4-1/4 107.95	13-3/8 377.73	10-3/4 273.05	TT10112	—
7 177.80	5-1/2 139.70	20 508.00	13-3/8 399.73	—	TT100093
8-5/8 219.08	7-1/4 184.15	36 914.40	24 609.60	—	TT64054
9-5/8 244.48	8-1/4 209.55	60 1,524.00	36 914.40	TT9994	—
10-3/4 273.05	9-1/2 241.30	60 1,524.00	36 914.40	TT9940	—
13-3/8 399.73	12 304.80	72 1,828.80	36 914.40	TT11485	TT11486



M.O.S.T.[™] Tool, Tension-Cut Version



The tension-cut version of the Weatherford mechanical outside-latch single-trip (M.O.S.T.) Tool is a cost-effective, environmentally safe tool for cutting and recovering wellheads up to 18-3/4 in. in a single trip. As an integral part of the tool system, the accompanying Weatherford mud motor does not have to be split.

Applications

- Single-trip cutting and retrieval of Vetcogray[™] MS-700[™] and SMS-700, Cameron, National SB, and Dril-Quip[®] DX wellheads to 18-3/4 in.
- Deepwater casing cutting and retrieval operations
- Single-trip or conventional cutting and retrieval of 9 5/8-, 13 3/8-, 20-, and 30-in. casing

Features, Advantages and Benefits

- External latching design prevents wellhead turning and listing and minimizes internal damage to the wellhead.
- Visual *latch* and *unlatch* confirmation ensures safe and dependable wellhead recovery.
- Excellent lateral support while attached over the wellhead eliminates most of the lateral whip for faster, smoother, more cost-effective cutting.
- Integrated Weatherford mud motor provides reliability for faster cutting, rig-time savings.
- Rig time is reduced with one-trip cut and recovery of wellhead.

Specifications

- 400,000-lb maximum pull capacity
- 200,000-lb maximum lift capacity

*The M.O.S.T. tool can be used as a lifting or pulling device. When used to pull, do not exceed 400,000 lb. *Pulling* is defined in this case as applying force to a stationary object, namely, when pulling the wellhead out of the seabed. Once the object is free, the M.O.S.T. tool is in *lifting* mode. When lifting, do not exceed 200,000 lb.

Options

- Grapples are available for retrieval of wellheads to 18-3/4 in. (Vetcogray[™] MS-700[™] and SMS-700, Cameron, National SB, and Dril-Quip[®] DX).

Vetcogray, MS-700, and Dril-Quip are trademarks of their respective companies.

M.O.S.T.[™] Tool for Use with Marine Swivel

The Weatherford mechanical outside-latch single-trip (*M.O.S.T.*) tool is a universal wellhead and casing cutting tool for well abandonment. This cost-effective, environmentally safe tool is designed to cut and recover wellheads up to 18-3/4 in. in a single trip while minimizing damage to them.

In contrast to other systems, which operate internally, the *M.O.S.T.* tool uses mechanically activated arms that latch onto the outside wellhead profile, eliminating the need to lock internally near the sealing areas. Using the tool in conjunction with a marine swivel, a mechanical multistring cutter, and a rubber stabilizer system extends the wellhead-saving benefits of the outside-wellhead profile latch design.

The *M.O.S.T.* tool dramatically reduces cutting times. Providing excellent lateral support while attached over the wellhead, the tool eliminates most of the lateral whip, which results in faster, smoother cutting.

Weatherford also offers another version of this tool, for use with a mud motor.

Applications

- Single-trip cutting and retrieval of wellheads to 18-3/4 in.
- Single-trip or conventional cutting and retrieval of 9 5/8-, 13 3/8-, 20-, and 30-in. casing
- All offshore casing cutting and retrieval operations, including deepwater applications beyond the Continental Shelf

Features, Advantages and Benefits

- External latching design minimizes internal damage to the wellhead.
- Visual *latch* and *unlatch* confirmation ensures safe and dependable wellhead recovery.
- Compression cut eliminates the need for a bumper sub to effect release or transmit torque and keeps the wellhead from turning for faster, smoother, more cost-effective cutting.
- Excellent lateral support while attached over the wellhead eliminates most of the lateral whip for faster, smoother, more cost-effective cutting.
- Rig time is reduced with one-trip cut and recovery of wellhead.

Specifications

- 400,000-lb maximum pull capacity
- 200,000-lb maximum lift capacity

*The *M.O.S.T.* tool can be used as a lifting or pulling device. When used to pull, do not exceed 400,000 lb. *Pulling* is defined in this case as applying force to a stationary object, namely, when pulling the wellhead out of the seabed. Once the object is free, the *M.O.S.T.* tool is in *lifting* mode. When lifting, do not exceed 200,000 lb.

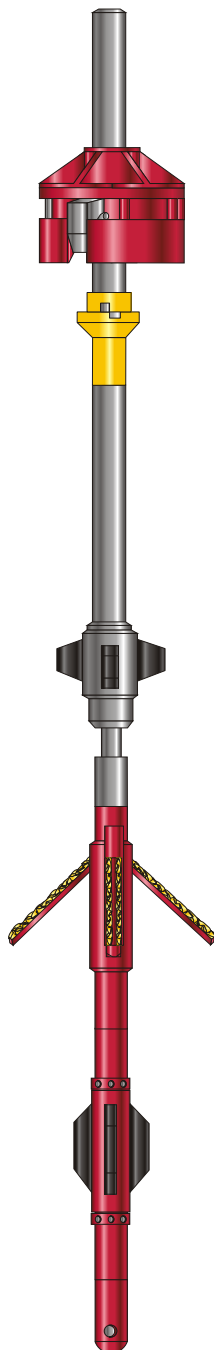
Options

- Grapples are available for retrieval of wellheads to 18-3/4 in. (Vetcogray[™] MS-700[™] and SMS-700, Cameron, National SB, and Dril-Quip[®] DX).

Vetcogray, MS-700, and Dril-Quip are trademarks of their respective companies.



M.O.S.T.™ Tool for Use with Mud Motor



The Weatherford mechanical outside-latch single-trip (*M.O.S.T.*) tool is a universal wellhead and casing cutting tool for well abandonment. This cost-effective, environmentally safe tool is designed to cut and recover wellheads up to 18-3/4 in. in a single trip while minimizing damage to them.

In contrast to other systems, which operate internally, the *M.O.S.T.* tool uses mechanically activated arms that latch onto the outside wellhead profile, eliminating the need to lock internally near the sealing areas. The outside wellhead profile latch design minimizes damage to the recovered wellhead, provides faster cutting in open water and eliminates cutting string wobble.

The *M.O.S.T.* tool dramatically reduces cutting times. Providing excellent lateral support while attached over the wellhead, the tool eliminates most of the lateral whip, which results in faster, smoother cutting.

Weatherford also offers another version of this tool, for use with a marine swivel.

Applications

- Single-trip cutting and retrieval of wellheads to 18 3/4 in.
- Single-trip or conventional cutting and retrieval of 9 5/8-, 13 3/8-, 20-, and 30-in. casing
- Deeper open-water depths and strong tidal current areas, such as those associated with the new outer Continental Shelf blocks and beyond

Features, Advantages and Benefits

- External latching design minimizes internal damage to the wellhead.
- Visual latch and unlatch confirmation ensures safe and dependable wellhead recovery.
- Compression cut requires no bumper sub to effect release or transmit torque.
- Excellent lateral support while attached over the wellhead eliminates most of the lateral whip for faster, smoother, more cost-effective cutting.
- Compression cut keeps wellhead from turning for faster, smoother, more cost-effective cutting.
- Rig time is reduced with one-trip cut and recovery of wellhead.

Specifications*

- 400,000-lb maximum pull capacity
- 200,000-lb maximum lift capacity

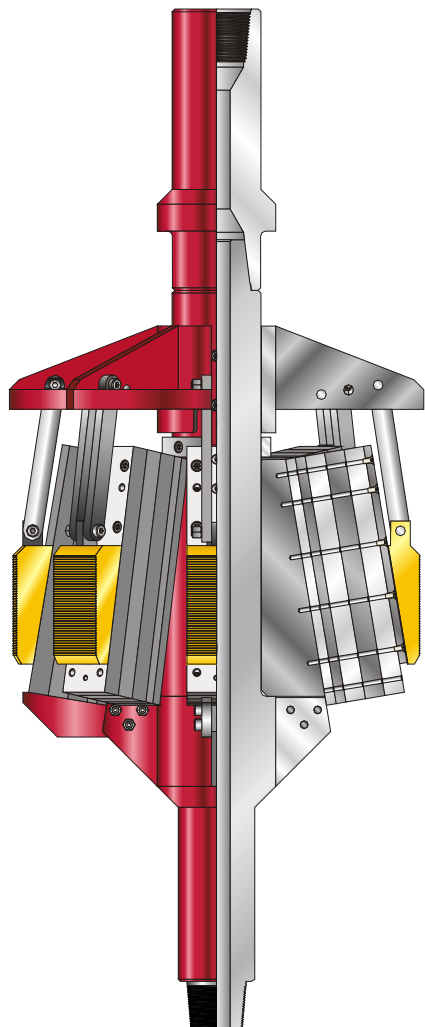
*The *M.O.S.T.* tool can be used as a lifting or pulling device. When used to pull, do not exceed 400,000 lb. *Pulling* is defined in this case as applying force to a stationary object, namely, when pulling the wellhead out of the seabed. Once the object is free, the *M.O.S.T.* tool is in *lifting* mode. When lifting, do not exceed 200,000 lb.

Options

- Grapples are available for retrieval of wellheads to 18-3/4 in. (Vetcogray™ MS-700™ and SMS-700, Cameron, National SB, and Dril-Quip® DX).

Vetcogray, MS-700, and Dril-Quip are trademarks of their respective companies.

Weatherford® 26- to 42-in. Casing Spear



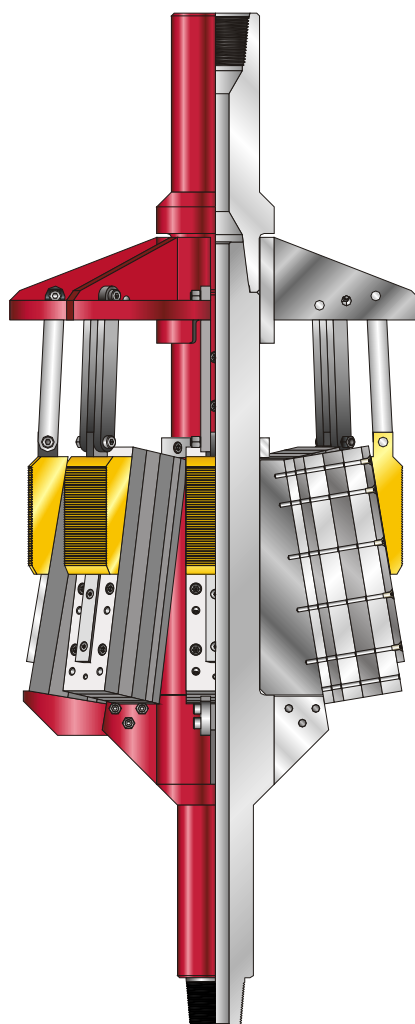
The *Weatherford* 26- to 42-in. casing spear is used to retrieve casing or line pipe with an ID of 25-3/4 through 42 in. This J-type casing spear is easily set with a one-eighth turn to the left and released with a one-eighth turn to the right.

Applications

- Retrieval of 25 3/4- to 42-in. OD casing or line pipe

Features, Advantages and Benefits

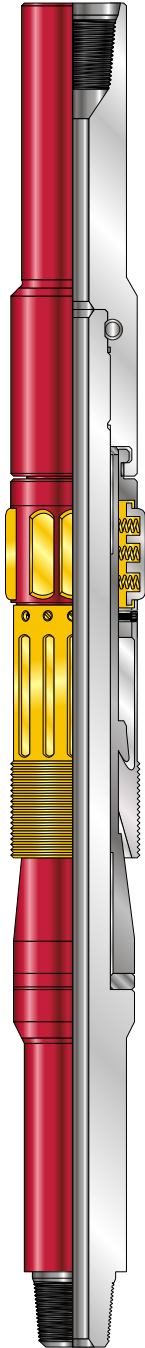
- One spear can be dressed to catch casing and line pipe in a wide range of sizes, minimizing the inventory of fishing tools.
- The spear is easily set and released to save time.



Specifications

Casing OD (in.)	Minimum Released OD (in./mm)	Maximum Catch OD (in./mm)
26	22-7/8 581.0	25-3/4 654.1
28	24-7/8 631.8	27-3/4 704.9
30	26-15/16 684.2	29-13/16 757.2
32	28-15/16 735.0	31-13/16 808.0
34	31 787.4	33-7/8 860.4
36	33 838.2	35-7/8 911.2
38	35-1/16 890.6	37-15/16 963.6
40	37-1/16 941.4	39-15/16 1,014.4
42	39-1/8 993.8	42 1,066.8

Deepwater STR Casing Spear



The Weatherford Deepwater STR Casing Spear System effects the speedy, single-trip removal of multi-string casings in offshore and onshore operations. The main component of the system is a rotatable spear with a compressible grapple, designed for use with a Weatherford M23 or M24 Casing Cutter.

Existing recovery technology dictates cutting the casing, then lifting it clear with a retrieval tool. Success of the latter part of this operation depends on the integrity of the mechanism used to grip the casing an integrity sometimes compromised by the wear suffered as the tool is run to the correct depth. For best results, take measures to retain full gripping capacity throughout the operation.

Applications

- Fast, single-trip removal of multi-string casings in offshore and onshore operations

Features

- Casing Spear can be dressed in two different configurations: a one-piece grapple or a segmented grapple assembly, depending on casing size and weight to be retrieved.
- Grapple compression allows entry of the casing spear to any depth of casing without wear on the grapple wickers.
- Robust construction with solid bronze thrust bearings accommodate heavy tension, torsional, and jarring loads.
- Tension on string while cutting facilitates easy cutting and removal operations.
- Grapple remains stationary when cutting casing and can be readily backed off from fish.

Benefits

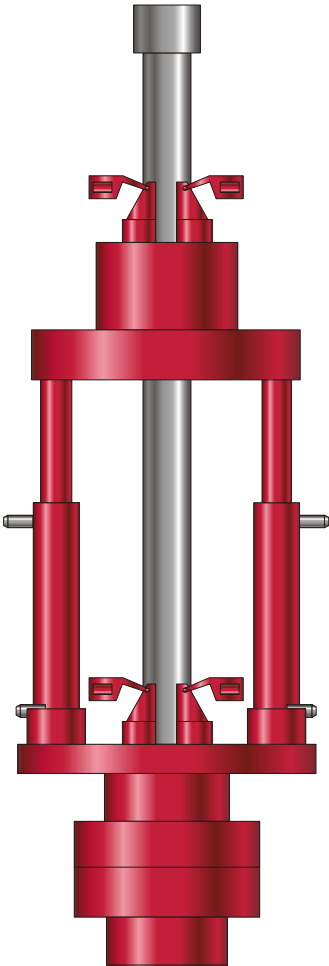
- Easier cutting and removal operations

Deepwater STR Casing Spear

Specifications

Casing		Grapple OD (in./mm)	Segment OD (in./mm)
OD (in.)	Weight (lb/ft)		
9-5/8	29.3 to 43.5	9.125 231.78	—
	40.0 to 53.5	8.898 226.01	—
	43.5 to 58.4	8.812 223.83	—
	53.5 to 64.9	8.598 218.39	—
10-3/4	32.75 to 48.0	10.255 260.48	—
	45.5 to 60.7	10.013 254.33	—
	60.7 to 65.7	9.723 246.96	—
11-3/4	42.0 to 60.0	11.147 283.13	—
	54.0 to 71.0	10.943 277.95	—
11-7/8	71.8	10.744 272.90	—
13-3/8	46.0 to 61.0	—	12.779 324.59
	68.0 to 85.0	—	12.478 316.94
	85.0 to 96.0	—	12.222 310.44
16	65.0 to 84.0	—	15.313 388.95
	109.0 to 128.0	—	14.75 374.65
	128.0 to 146.0	—	14.501 368.33

Casing Jacks



Weatherford Casing Jacks allow application of heavy pulling loads to casing or other large tubulars to supplement rig pulling capacity. Casing Jacks are used on abandonment jobs to free stuck casing and pull enough pipe to lower the string weight for the rig to handle. Casing Jacks are also used to re-hang casing in wellheads. Casing Jacks provide the pull needed to reset the casing hanger at the original tension at which the casing was set.

Applications

- Abandonment operations: freeing stuck casing and pulling pipe to relieve string weight for the rig
- Casing re-hanging operations: supplementing rig pulling capacity to reset the casing hanger at original tension, regardless of rig type

Features

- 100:1 jacking ratio
- 6,000-PSI lift capacity for 600,000 lb of total lift
- Compatibility with API casing-handling equipment
- Pull exertion against top of wellhead flange rather than rig derrick or substructure
- High-pressure, self-contained hydraulic power unit
- Jacking beams available

Benefits

- Reduce wear on the rig
- Require only medium pressure for operation

Operations

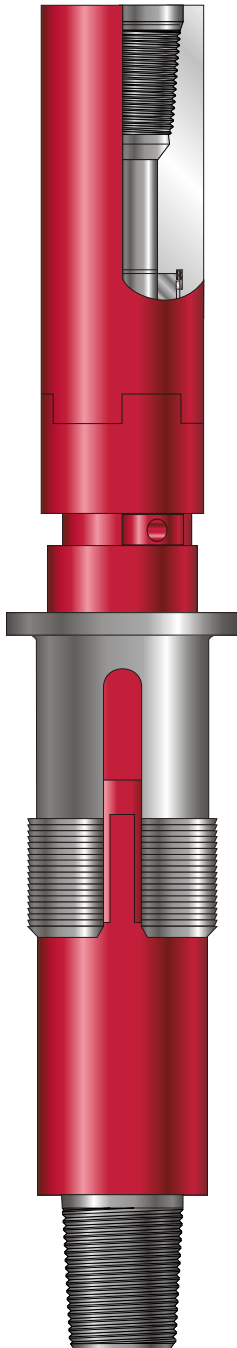
1. Set up the jack system, and connect the manifold.
2. Make up a casing spear and drill pipe pup joint, and insert into the top of the casing.
3. Set the spear, leaving enough of the pup joint exposed to set the top set of the slips.
4. With upper and lower slips in place, slowly cycle the jacks, and pick up the casing in the wellhead so that the casing hanger clears the bottom slip area.
5. Set the bottom slips, and remove the casing hanger.
6. If re-hanging the casing, replace the casing hanger, and remove the jacks when appropriate tension is reached. For an abandonment operation, continue jacking until the casing is free enough for the rig to pull. In cases that preclude use of the jacking spool, use two wide-flange beams to support and stabilize the jacks.

Specifications

Casing Jack OD (in./mm)	Jacking Plate (ton/kg)	Jacking Spool
9-3/4 248	350 317,515	Integral 11-in. 279 to 300 lb Flang and Bowl

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H-E Universal Rotating and Releasing Spear



The Weatherford H-E universal rotating and releasing spear is used with the Weatherford H-E reversing tool to transmit significant degrees of torque in back-off operations. The spear penetrates the ID of tubing, drillpipe, or casing to engage the fish, transmits right- or left-hand torque, and easily releases.

Applications

- Transmits tremendous torque in back-off operations

Features

- Penetrates ID of tubing, drill pipe, or casing
- Rugged, long-life construction

Benefits

- Easy, positive release
- Easy field maintenance

Operation

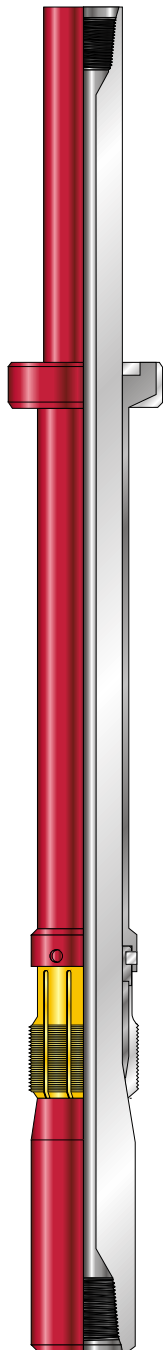
1. Run the spear in the catch position, penetrating the ID of the string.
2. Apply an upward pull of 30,000 to 40,000 lb overpull to set the grapple in the fish.
3. Reduce weight to a minimum of 3,000 lb overpull.
4. Apply right- or left-hand torque to back off and retrieve the fish.

H-E Universal Rotating and Releasing Spear

Specifications

Tool			Spear Length (in./m)	Catch Range (in./mm)	Maximum Strengths		Assembly Number
Size (in.)	OD (in./mm)	ID (in./mm)			Pull Yield (lb/ft, N)	Torque Yield (lb/ft, N·m)	
2-3/8	1-29/32	3/8 9.53	30 0.76	1.955 to 2.323	121,500	2,000	14272
2-7/8	48.42			50.67 to 59.00	540,432	2,712	
2-7/8	2-5/16 58.74	1/2 12.70	38 0.97	2.44	157,680	3,000	17273
				162.00	701,361	4,067	
3-1/2	2-11/16 68.26			2.750 to 3.068	180,000	6,600	14274
				69.85 to 77.93	800,640	8,948	
4	3-1/8 79.38	1 25.40	40 1.02	3.476 to 3.550	124,020	16,000	14275
				88.29 to 90.17			
4-1/2				3.754 to 4.090	551,641	21,692	14807
				95.35 to 103.89			
5	4-1/16 103.19	1-1/4 31.75	47 1.19	4.156 to 4.560	185,400	44,000	14726
				105.56 to 115.82			
5-1/2				4.892 to 5.012	824,659	59,653	14808
				124.26 to 127.30			
6-5/8	5-11/16 144.46	2-1/4 57.15	50 1.27	5.791 to 6.049	900,000	70,000	14277
				147.09 to 153.64			
7				6.184 to 6.538			14809
				157.07 to 166.07	4,003,200	94,903	
7-5/8				6.625 to 7.125			14810
				168.28 to 180.49			
8-5/8	7-1/4 184.15	3 76.20	55 1.40	7.725 to 8.097	1,000,000	130,000	14278
				196.22 to 205.66			
9-5/8				8.435 to 9.063			14812
				212.25 to 230.20			
10-3/4				9.660 to 10.1920	4,448,000	176,248	14813
				245.36 to 258.88			
11-3/4				11.000 to 11.084			14814
				279.40 to 281.53			
13-3/8	11-3/4 298.45	3-3/4 95.25	60 1.52	12.159 to 12.715	2,780,000	300,000	14279
				308.84 to 322.46			
16				5.010 to 15.25			14815
				381.25 to 387.35			
18-5/8				NA			14816
				19.00 to 19.124			14817
20				482.6 to 485.75			
24	18-3/4	4	72	NA	NA	NA	14818
30	476.25	101.60	1.83				14819

Single-Trip Tool



The Weatherford single-trip tool (STT), when combined with a casing cutter, provides a straightforward, reliable solution for removing casing on land and in subsea operations. Even the most demanding retrieval operations are no problem for this rugged tool. Simply position the grapple assembly at the top of the casing while feeding the rest of the tool string through the grapple assembly to the required cutting depth. After cutting is complete, retrieve the string along with the cut casing; resetting is not required.

Applications

- Land and subsea casing removal operations

Features

- Easy-to-use, straightforward design

Benefits

- Single-trip operation

Specifications

Tool OD (in.)	Casing OD (in.)	Catch Range (lb/ft)
7-1/4	9-5/8	53.5 to 58.4
		36.0 to 47.0
		29.3 to 32.3
	10-3/4	55.5 to 60.7
		45.5 to 51.0
		32.75 to 40.5
11-3/4	11-3/4	42.0 to 47.0
	13-3/8	77.0 to 85.0
		68.0 to 72.0
		54.5 to 61.0
		48
		88.2

Marine Swivel Series

Weatherford's Marine Swivel Series is used with the Weatherford M23 and M24 Casing Cutters for cutting all sizes of casing, conductor, and drive pipe from full floating and semi-submersible drilling rigs. The Marine Swivel facilitates cutting single and multiple-string casing, even when cemented together, and accommodates an outer string casing of up to 36 in. outside diameter (OD).

A simple, rugged tool design makes the Marine Swivel reliable and easy to maintain. High-quality manufacturing and materials ensure safe operation, without damage to wellhead equipment.

Applications

- Cutting all sizes of casing, conductor, and drive pipe from full floating and semi-submersible drilling rigs

Features

- Simple, rugged design
- High-quality materials and manufacturing

Benefits

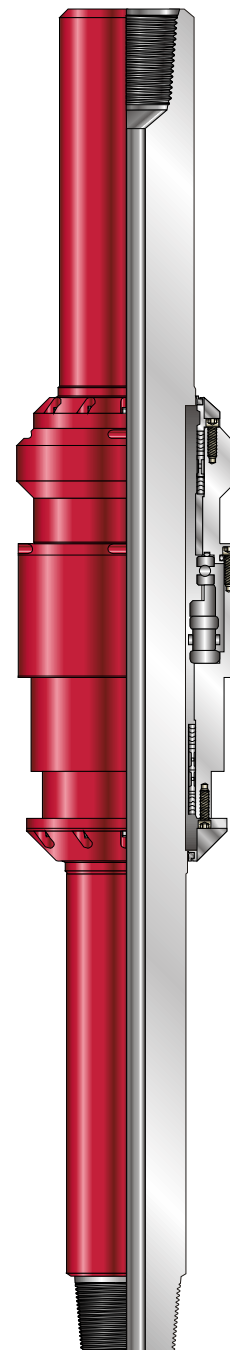
- Reliable performance
- Easy maintenance
- Safe operation, without damage to wellhead equipment

Specifications

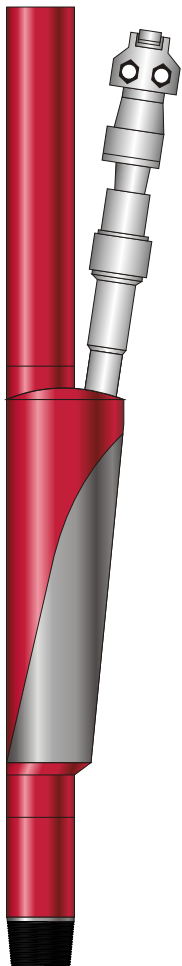
Series	Support Ring OD (in./mm)	Support Ring Part Number	Maximum Thrust Bearing Capacity		Thrust Bearing Part Number
			Static Load ¹ (lb/kg)	Dynamic Load ² (lb/kg)	
1050	13.650 346.7	9978	102,000 46,266	45,000 20,412	809785
1100	12.000 304.8	11125	91,500 41,504	23,000 10,433	870036
	13.375 339.7	10110			
	14.250 362.0	10032			
	16.250 412.8	10855			
	18.500 469.9	11257			
1400	14.250 362.0	13664	599,000 271,702	258,000 117,027	810768
	16.250 412.8	13663			
	20.000 508.0	60792			
	35.000 889.0	60194			

¹ Static load is the load the bearing is capable of supporting without permanent deformation of the bearing components.

² Dynamic load is the load carried at 33-1/3 RPM for 500 hours with no evidence of fatigue, as tested by the manufacturer.



Wireline Side-Entry Assembly



Weatherford's wireline side-entry assembly allows the operator to run wireline in back-off operations without compromising the ability to circulate the well. It allows use of the top drive system for pumping wireline tools downhole and circulating fluid through the stuck drillstring.

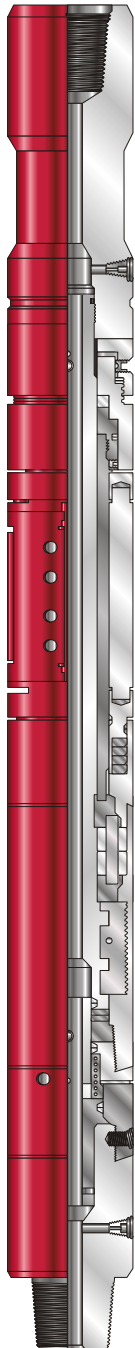
The side-entry assembly consists of a safety valve, a drillpipe swivel, a pump-in sub, one joint of drillpipe, a side-entry sub, and one joint of drillpipe that is connected to the top drive system. The rotary table is used to torque pipe for determining the free point and backing off the stuck drillstring.

Features, Advantages and Benefits

- The wireline side-entry assembly eliminates the need to change out elevator bails, saving rig time.
- Drillpipe stays tied into the top drive unit, and tools can be pumped downhole at any time.
- After the backoff is made and tools are removed, a plug can be installed on the side-entry assembly to circulate the well before rigging down the wireline lubricator.

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H-E Reversing Tool



The Weatherford H-E Reversing Tool allows unscrewing and recovery of stuck sections of right-hand strings of drill pipe or tubing without the need for a complete string of left-hand pipe.

A combination of planetary gearing and anchoring systems, the Reversing Tool can convert right-hand torque from the surface to a powerful left-hand torque below the tool to the fish.

Applications

- Unscrewing and recovery of stuck sections of right-hand strings of drill pipe or tubing

Features

- Planetary gearing and anchoring system
- Conversion of right-hand torque from surface to a powerful left-hand torque below tool

Benefits

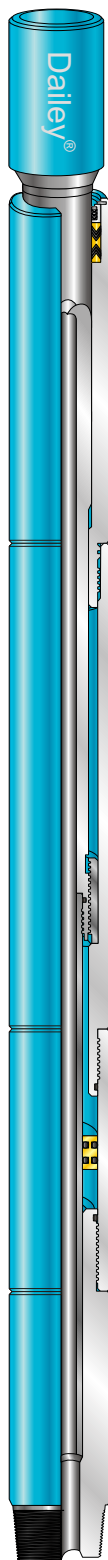
- Internal diameters permit the use of the string shot and facilitate other fishing operations such as washing down, engaging and disengaging the fish, and releasing the tool and the fish.
- Torque-reversing capability eliminates the need for a complete string of left-hand pipe for back-off operations.

H-E Reversing Tool

Specifications

Nominal Size (in.)	OD (in./mm)	ID (in.)	Length (ft/m)	Casing Size	To Back Off	Part Number	Weight (lb/kg)	Maximum Yield Tensile Strength (Static) (lb/kg)	Pull-up Tensile Load for Rotary Right-hand Release and RPM (lb/kg)	Maximum Torsional Yield (lb/ft)	Maximum Pump Pressure		
											Internal (PSI/bar)	To Lock Tool Static (PSI/bar)	To Lock Tool in Hole (PSI/bar)
3	3-3/4 95.3	5/8 15.9	106 32.3	4 1/2-in. up to 13 lb through 5 1/2-in. up to 13 lb	Any Size	16084	210 95.3	90,000 40,823	20,000 to 50,000 9,072 to 22,680 90-100 RPM	Input 4,000 ft-lb Ratio 1 78:1 Output 7,120 ft-lb	5,000 345	200 14	600 41
4	4-1/16 103.2	1-1/8 28.6	116 35.4	5-in. up to 18 lb through 7-in. 38 and 40 lb		15690	375 170.1	150,000 68,039	50,000 22,680 100 RPM	Input 10,000 ft-lb Ratio 1 78:1 Output 17,800 ft-lb		150 10	500 34
6	5-13/16 147.6		147 44.8	7-in. up to 35 lb through all weights 8 5/8-in.		16082	—	200,000 90,718	60,000 to 80,000 27,216 to 36,287 120 RPM	Input 14,000 ft-lb Ratio 1 78:1 Output 24,920 ft-lb			
8	7-3/4 196.9		157 47.9	9 5/8-in. through 1 3/4-in.		16083		400,000 181,437	Up to 100,000 Up to 45,359 120 RPM	Input 22,000 ft-lb Ratio 1 78:1 Output 39,160 ft-lb			
				11 3/4-in. through 13 3/8-in.									

Dailey® Lubricated Bumper Sub



The Weatherford® *Dailey* lubricated bumper sub complements the *Dailey* hydraulic fishing jar and the *Dailey* HyPulse Jar Slinger®, providing better control of the fishing string and greatly reducing bottomhole assembly (BHA) vibration. Providing a more subdued upward or downward bump to the fishing string, the bumper sub also aids in disengaging a fish after retrieval.

This easily transported bumper sub can be used in high-angle, shallow or deep wells, including high-temperature and high-pressure formations. The bumper sub is useful in recovery of BHAs, drillpipe, tubing and packers in cased or open hole.

With the field-proven Weatherford single-piece mandrel and the same torque and debris-isolation system used in the *Dailey* hydraulic fishing jar and *HyPulse Jar Slinger*, this reliable bumper sub is a world-class performer.

Applications

- Any application (for example, fishing, coring and washover) that requires a downward blow to a stuck point or tight spot to release fishing tools, activate shearing mechanisms, or break off a core before retrieving it. The bumper sub can also deliver an upward blow to a stuck point.
- The bumper sub allows the operator to “feel” for the top of a fish without applying excess weight. When the bumper sub is used with a milling/cutting tool, its sliding-sleeve effect allows adjustment of the weight to the cutting tool to prevent overloading or stalling. The fishing string can be manipulated, taking advantage of the string rebound, to increase upward or downward impact.

Features, Advantages and Benefits

- Rugged, durable construction for reliability and longer tool life
- Sliding-sleeve effect for weight adjustment to milling/cutting tool and prevention of overloading or stalling
- Single-piece involute spline for maximum torque capacity with minimal backlash
- Fluid-isolated chamber for protection against formation cuttings, sand, and other downhole debris

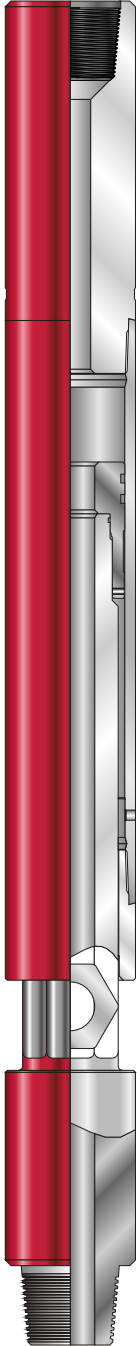
Dailey® Lubricated Bumper Sub

Specifications

OD (in./mm)	ID (in./mm)	Tool Joint Size (SPI)	Tensile Yield* (x 1,000 lb) (x 1,000 N)	Torsional Yield* (x 1,000 lb/ft) (x 1,000 N•m)	Length Closed (ft-in./m)	Weight (lb/kg)	Total Stroke (in./mm)	Maximum BHT (°F/°C)	Pump Open Area (in. ² /cm ²)
1-13/16 46	1/2 13	1-13/16 WFJ	75 334	1.6 2.2	7 ft, 6 in. 2.3	50 23	12 305	400 204	1.1 7.1
2-1/8 54	11/16 18	1-1/2 AMMT	86 383	0.85 1.2	4 ft, 7 in. 1.4	40 18	9-1/2 241		1.2 7.7
2-1/4 57	11/16 18	1-1/4 Reg.	110 489	2.5 3.4	7 ft, 10.in 2.4	100 45	12 305		1.8 11.6
2-7/8 73	13/16 21	2-3/8 PAC	106 472	2.6 3.5	4 ft, 1 in. 1.2	90 41	9-1/2 241		2.1 13.5
3-1/8 79	1-1/4 32	2-3/8 Reg.	250 1,112	5 6.8	9 ft, 2 in. 2.8	180	16		4
	1-1/2 38	2-7/8 PAC	200 890	5 6.8	9 ft, 4 in. 2.8	82	406		25.8
3-3/4 95	1-1/2 38	2-3/8 IF, EUE	328 1,459	9.5 12.9	9 ft, 4 in. 2.8	270 123	16-1/8 410		5.9 38.1
	1-3/4 45		260 1,157	7.8 10.6		220 100			
	1-15/16 49	2-3/8 EUE			10 ft, 6 in. 3.2	230 104			
4-1/4 108	2-1/8 54	2-7/8 IF	325 1,446	15 20.3	9 ft 2.7	290 132	16 406		7.7 49.7
4-3/4 121	2-1/4 57	3-1/2 IF	500 2,224	20 27.1	11 ft, 4 in. 3.5	440 200	15 381		10.3 66.5
6-1/4 159	2-1/4 57	4-1/2 IF	1,000 4,448	49.3 66.8	12 ft, 3 in. 3.7	1,000 454	16-1/2 419		15.9 102.6
6-1/2 165	2-3/4 70	4-1/2 IF	1,000 4,448	56.2 76.2	13 ft, 4 in. 4.1	900 408	17 432		19.6 126.5
7-3/4 197	3 76	6-5/8 Reg.	1,600 7,117	100 135.6	14 ft, 11 in. 4.5	1,900 862	19-1/2 495		28.3 182.6
8 203	3 76	6-5/8 Reg.	1,600 7,117	105 142.4	14 ft, 11 in. 4.5	2,000 907	19-1/2 495		28.3 182.6

*Tensile and torsional values are calculated per API RP7G based on nominal dimensions and the published yield strength of the material and do not constitute a guarantee, actual or implied.

Mechanical Fishing Bumper Sub



Weatherford's mechanical fishing bumper sub is used to remove stuck fish or to release a spear or an overshot from a fish.

The bumper sub is installed in the fishing string, directly above the attachment tool. Lowering the string at a rapid rate until the hex guide sub strikes the lower sub, which produces a sharp downward blow. Raising the string until the hex guide sub strikes the upper portion of the stem produces a sharp upward blow.

Features, Advantages and Benefits

- The mechanical fishing bumper sub is easy to operate.
- Rugged construction and ease of maintenance extend the life of the tool and enhance performance reliability.

Mechanical Fishing Bumper Sub

Specifications

Connection	OD (in./mm)	ID (in./mm)	Stroke Length (in./mm)							Piston Cup	Complete Assembly
			18 457.20	20 508.00	24 609.60	30 762.00	36 914.40	40 1,016.00	60 1,524.00		
1 13/16-in. HOMCO® SL	1-13/16 46.08	3/8 9.53	•	•	•		•			767-825	451-106
1 1/4-in. API REG	2-1/4 57.15	1/2 12.70	•	•	•		•			603-202	451-114
2 3/8-in. API REG	3-1/8 79.38	3/4 19.05	•	•	•		•			603-203	451-119
2 3/8-in. API REG	3-1/2 88.90	1 25.40	•	•	•		•			603-207	451-121
2 3/8-in. EUE					•*						451-215*
2 3/8-in. API IF	3-3/4 95.25	1-3/4 44.45		•	•	•	•			603-190	451-126
2 7/8-in. API REG		1-1/4 31.75		•	•	•	•				451-129
2 3/8-in. EUE	3-7/8 98.43	1-7/8 47.63		•	•	•	•			603-190	451-125
2 7/8-in. API REG		1-1/4 31.75		•	•	•	•				451-128
2 7/8-in. API IF	4-1/8 104.78	2 50.80		•	•	•	•			601-699	451-132
2 7/8-in. API IF	4-1/4 107.95	2 50.80		•	•	•	•			604-814	451-137
3 1/2-in. AC REG		1-1/2 38.10			•					601-699	451-140
3 1/2-in. API REG				•	•	•	•				451-141
2 7/8-in. EUE	4-1/2 114.30	2-7/16 61.91			•					601-700	451-145*
3 1/2-in. API FH	4-3/4 120.65	2 50.80		•	•	•	•			601-700	451-149
4 1/2-in. API FH	6 152.40	2-1/4 57.15		•	•	•	•			601-492	451-153
4 1/2-in. API IF	6-1/4 158.75	2-1/2 63.50		•	•	•	•	•	•	601-492	451-154
4 1/2-in. API FH	6-1/2 165.10	2-1/4 57.15		•		•		•	•	601-492	451-158
4 1/2-in. API FH	6-3/4 171.45	2-7/8 73.03		•		•		•	•	601-701	451-160
5 1/2-in. API REG		2-3/4 69.85		•		•		•	•		451-161
5 1/2-in. API FH	7 177.80	2-7/8 73.03		•		•		•	•	601-701	451-165
6 5/8-in. API REG	7-3/4 196.85	2-13/16 71.44		•		•		•	•	603-169	451-167
6 5/8-in. API REG	8 203.20	2-13/16 71.44		•		•		•	•	603-169	451-170
7-in. H-90	8-3/4 222.25	3 76.20		•		•		•	•	604-326	451-171

* Indicates bumper jars used with internal casing patch tools

To order, specify assembly number, stroke length, and connection. Other sizes and stroke lengths are available on request.
Recommended spare parts: 8 each, seals.

Wright PBP-Retrieving Bushing Assembly



The Weatherford® Wright PBP-retrieving bushing assembly provides an efficient, single-trip solution for burning over and retrieving packers or bridge plugs from the wellbore to prevent them from falling. The fishing tool remains engaged throughout the operation. Release from the work string is automatic with a simple up-down motion. With only two components, the assembly is easy to use and saves rig time.

Applications

- Single-trip milling and retrieval of packers or bridge plugs
- Retrieval of most fish types that can be attached and washed over on the same trip

Features, Advantages and Benefits

- Simple two-piece construction
- Versatile design for use with screw-in subs, spears, taper taps, overshots, or any attachment tool
- Positive attachment to the fish throughout the operation
- Right-torque operation to minimize the potential of backing off retrieving packers
- Usability for packers
- Adaptability for running with a positive displacement motor if pipe cannot be rotated
- Patented integral, multi-spline mandrel for efficient multiple releases and attachments of two components
- Positive shear-pin lock
- Operational ease and efficiency
- Versatility
- Minimized risk of a falling packer or bridge plug
- Reduced rig time

Wright PBP-Retrieving Bushing Assembly

Specifications

Bushing OD (in.)	5-5/8	8-1/8
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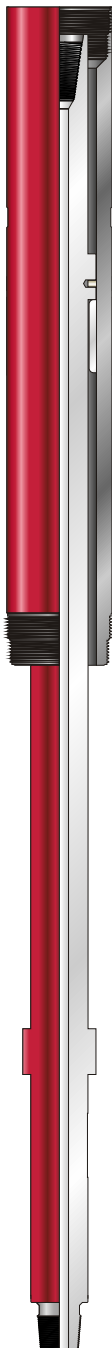
Outer Housing		
Top connection	5-1/2	8-1/8
Lower connection	17 lb/ft FJWP	34.56 lb/ft FJWP
Makeup torque (ft-lb)	2,200	7,500
Torsional yield (ft-lb)	9,000	30,000
Tensile strength (lb)	206,000	406,000

Inner Mandrel		
Top connection (in.)	2-7/8 API Regular Box	3-1/2 IF Box
Makeup torque (ft-lb)	6,500	9,100
Torsional yield (ft-lb)	13,000	18,100
Tensile strength (lb)	493,600	587,310
Lower connection (in.)	3-1/8 PRT Pin	4-1/4 PRT Pin
Makeup torque (ft-lb)	6,140	13,250
Torsional yield (ft-lb)	12,285	26,500
Tensile strength (lb)	323,000	507,600
Tensile strength of lugs (lb)	117,203	311,580
Torsional strength of lugs (ft-lb)	22,000	78,000
Minimum ID through lugs (in.)	4-5/8	5-1/2
Maximum OD of inner mandrel (in.)	4-1/2	5-3/4
Fishing neck OD (in.)	3-3/4	4-1/4
Fishing neck length (ft)	2.5	3.5

Rotary Shoe		
Maximum OD	To suit casing drift ID	
Minimum ID (in.)	4.625	5.875

Note: Other sizes are available on request. Torsional and tensile yield strengths do not include safety factors. Jarring is not recommended. If jarring is required, apply only the minimum loads.

Type M J-Bushing



Weatherford's type M J-bushing is used to burn over and retrieve a packer or a bridge plug from a wellbore in a single trip and prevent the packer or bridge plug from falling. One of the main advantages of the J-bushing is that it can be used in conjunction with an assortment of attachment tools (spears, overshots, and taps) to retrieve most types of fish. Another important advantage is that the J-bushing provides positive engagement with the fish throughout the entire operation.

The J-bushing consists of two parts: the body, with washpipe threads on both ends, and an internal mandrel, with small-diameter work-string threads.

Releasing from the work string requires only a quarter turn, with left-hand torque, at the bushing.

Features, Advantages and Benefits

- Simple two-piece construction provides operational ease and efficiency and saves rig time when retrieving packers or bridge plug assemblies.
- Versatile design allows use with screw-in subs, spears, taper taps, overshots, or any attachment tool for operational flexibility.
- Positive engagement with the fish throughout the operation limits nonproductive time and minimizes the risk of a packer or bridge plug falling.
- The J-bushing is easily released and re-engaged multiple times for operational efficiency.

Specifications

Tool OD (in./mm)	Drive Bushing	Mandrel
3.750 95.3	3 3/4-in. FJWP box x pin	1 13/16-in. WFJ box x pin
4.000 101.6	4-in. FJWP box x pin	1 1/4-in. Reg. box x pin
4.375 111.1	4 3/8-in. FJWP box x pin	
4.500 114.3	4 1/2-in. FJWP box x pin	
5.360 136.1	5-in. X-LINE box x pin	2 3/8-in. Reg. box x pin
5.500 139.7	5 1/2-in. FJWP box x pin	
5.625 142.9	5 5/8-in. FJWP box x pin	
6.000 152.4	6-in. FJWP box x pin	
8.010 187.7	7 5/8-in. X-LINE box x pin	

TripSaver™ Bushing

Weatherford's *TripSaver* bushing is a one-trip multi-functional tool that can be used in many applications: washing over screened liners, milling over and retrieving packers or bridge plugs, or aligning small internal milling or washout assemblies. The *TripSaver* bushing replaces the top sub on washover strings, which allows the use of various attachments or milling tools when the washover operation is completed, without making repeated trips.

Applications

- Washing over and retrieving screened liners
- Milling over and retrieving packers or bridge plugs
- Aligning internal milling or washout assemblies

Features, Advantages and Benefits

- Simple construction provides one-trip operational ease and efficiency, saving valuable rig time.
- Compatibility with any attachment tool or internal milling or washout assembly provides versatility and reduces overall equipment costs.
- The bushing minimizes the number of additional trips after washover and packer/bridge plug milling operations.

Specifications

OD (in./mm)	Washpipe Connection	Mandrel Connection	Drill Collar OD (in./mm)
3-3/4 95.250	3 3/4-in. FJWP	2 3/8-in. EUE 8RD pin down x 2 3/8-in. WFJ box up	2-1/2 63.500
4 101.600	4-in. FJWP	2 3/8-in. API Reg. pin down x 2 3/8-in. PAC box up	2-7/8 73.025
4-3/8 111.125	4 3/8-in. FJWP	2 3/8-in. API Reg. pin down x 2 3/8-in. PAC box up	2-7/8 73.025
4-1/2 114.300	4 1/2-in. FJWP	2 3/8-in. API Reg. pin down x 2 3/8-in. API Reg. box up	3-1/8 79.375
5-1/2 139.700	5 1/2-in. FJWP	2 7/8-in. IF pin down x 2 7/8-in. IF box up	4-1/8 104.775



J bushing

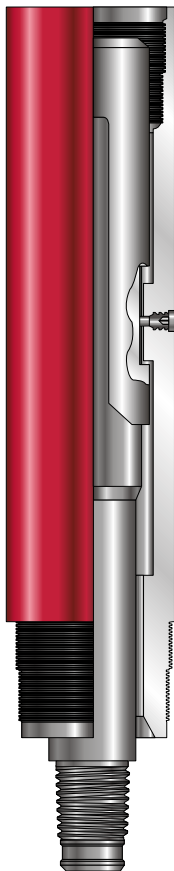


J mandrel



Extension

J-Type JB Bushing Assembly



The Weatherford J-Type JB Bushing Assembly is used to mill over and retrieve, in one trip, packers or bridge plugs that cannot be recovered by conventional methods. The J-Type JB Bushing Assembly consists of two parts and is designed to be used with any type of fishing tool or engaging device.

Applications

- Milling over and retrieving packers or bridge plugs that cannot be recovered by conventional methods
- Milling over and recovering packers and tailpipe assemblies without mill-out extensions

Features

- Wide range of washpipe connections
- Designed for use with any type of engaging device

Benefits

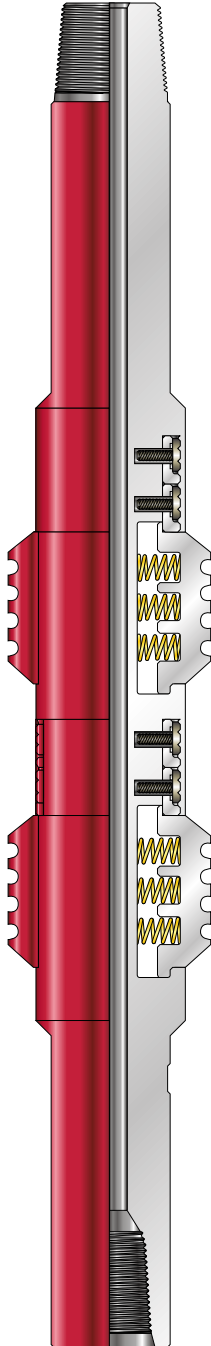
- Solution for retrieving packers not retrievable by conventional methods
- Time and cost savings
- Versatility

Specifications

Washpipe Connection	Bottom J Sub Connection	Body	
		OD (in./mm)	ID (in./mm)
3-13/16 TSWP	2-1/4 PRT	3-13/16 96.84	2-9/16 65.09
4 TWSP	2-3/8 FJ	4 101.60	2-11/16 68.26
4-3/8 TWSP	2-3/8 EUE	4-3/8 111.13	3-3/16 80.96
	2-1/4 PRT		3-5/16 84.14
4-1/2 TWSP	2-3/8 EUE	4-1/2 114.30	3-3/16 80.96
5 TWSP	2-3/8 EUE	5 127.00	3-5/8 92.08
5 X-line	2-7/8 EUE	5-3/8 136.53	3-3/4 95.25
5-1/2 TWSP	2-3/8 AZPI Reg.	5-1/2 139.70	4-1/16 103.19
5-3/4 TSS	2-7/8 EUE	5-3/4 146.05	4-1/4 107.95
7-3/8 TSWP	3-1/2 API IF	7-3/8 187.33	5-7/8 149.23
8-1/8 TWSP	3-1/2 API IF	8-1/8 206.38	6-3/8 161.93

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Type E Casing Scraper



The Weatherford Type E casing scraper is a durable tool used to remove mud, cement, imbedded bullets, perforation burrs, rust, mill scale, paraffin, and other substances from the inside walls of casing. Maintaining a smooth, clean casing inside diameter is important for successful downhole operations, such as packer setting and swabbing, and for proper functioning of squeeze tools, the Weatherford internal casing patch, and similar downhole tools.

Applications

- Cleanup after operations that leave obstacles in the casing, such as cementing and perforating, before removal of the rotary rig
- Preparation for downhole operations such as packer setting, swabbing, squeezing, and patching

Features, Advantages and Benefits

- Finest alloy steel construction optimizes performance.
- Six precision-machined pockets for receiving the blades overlap to ensure 360° coverage within the casing.
- Helical blade teeth enhance shearing action efficiency.
- Tungsten carbide-tipped blades, ground to close tolerances, ensure uniform cutting edges.
- Spring-loaded blades ensure firm contact with the casing at all times.

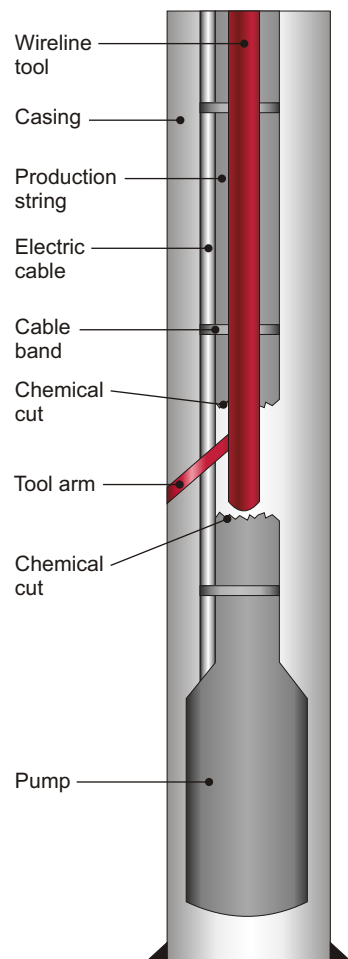
Type E Casing Scraper

Specifications

Casing					Scraper					
Size (in./mm)	Minimum Weight (lb/ft, kg/m)	Maximum Weight (lb/ft, kg/m)	Minimum ID (in./mm)	Maximum ID (in./mm)	Minimum Blade Expansion (in./mm)	Maximum Blade Expansion (in./mm)	Body OD (in./mm)	Body ID (in./mm)	Connection Size (in.)	Complete Assembly Part No.
4-1/2 114.3	9.50 14.14	15.1 22.48	3.826 97.18	4.090 103.89	3.701 94.0	4.906 124.6	3.594 91.29	0.75 19.05	2-3/8 Reg	61571-001
5 127.0	11.50 17.13	18.0 26.81	4.276 108.60	4.560 115.80	4.139 105.1	5.461 138.7				61571-002
5-1/2 139.7	14.00 20.83	23.0 34.26	4.670 118.60	5.012 127.30	4.545 115.4	5.902 149.9	4.438 112.73	1.00 25.40	2-7/8 Reg	61572-001
6 152.4	16.00 23.83		5.240 133.10	5.500 139.70	5.045 128.1	6.407 162.7				61572-002
6-5/8 168.3	20.00 29.79	32.0 47.66	5.675 144.10	6.049 153.60	5.550 140.9	7.441 189.0	5.437 138.10	1.25 21.75	3-1/2 Reg	61573-001
7 177.8	23.00 34.26	38.0 56.60	5.920 150.40	6.366 161.70						61573-001
7-5/8 193.7	24.00 35.75	39.0 58.09	6.625 168.30	7.025 178.40	6.425 163.2	8.315 211.2				61573-002
8-5/8 219.1	24.00 35.75	49.0 72.91	7.511 190.80	8.097 205.70	7.386 187.6	9.253 235.0	7.250 184.15	2.00 50.80	4-1/2 Reg	61574-001
9-5/8 244.5	36.00 53.62	53.5 79.69	8.538 216.80	8.921 226.60	8.386 213.0	10.253 260.4	8.250 209.55	2.25 57.15		61575-001
10-3/4 237.1	32.75 48.78	71.1 105.90	9.450 240.00	10.192 258.90	9.294 236.1	11.383 289.1	9.125 231.78			61576-001
13-3/8 339.7	48.00 71.50	72.0 107.24	12.347 313.60	12.715 323.00	12.191 309.7	14.199 360.7	12.000 304.80	3.50 88.90	6-5/8 Reg	61577-001

Note: Weatherford does not recommend any drilling or milling with the Weatherford Type E casing scraper.

Armstrong Cable Cutter



The Armstrong cable cutter is used to cut electric cables that are banded on the outside of production strings for supplying power to submersible pumps. This rugged, efficient tool is designed for durability and reliability and can be run on sucker rods, macaroni tubing, or tubing, depending on the production string ID.

Specifications

- Standard cable cutters can be run through 2 3/8-in. EUE, 2 7/8-in. EUE, and 3 1/2-in. EUE tubing; larger sizes are available on request.

HE-Type DH Outside Cutter

The HE-type DH outside cutter is designed to wash over, cut, and recover stuck tubing of lengths up to 1,500 ft (457 m) in a single trip. Unlike most external cutters, the DH outside cutter eliminates the initial run of the rotary shoe and washover pipe, thus saving as much as 50 percent of valuable rig time ordinarily required for such operations. Because the DH outside cutter is completely releasable, the tool virtually eliminates expensive repair charges normally incurred if the cut cannot be made.

Features, Advantages and Benefits

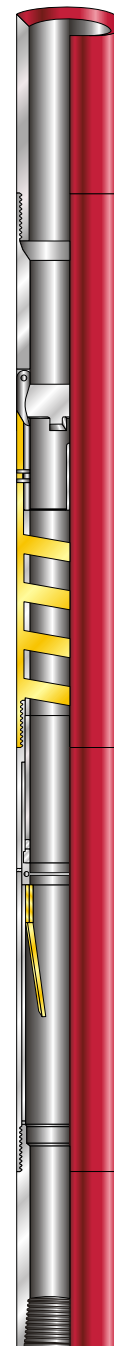
- Removal of wash pipe from the hole before making additional cuts is not necessary, saving rig time.
- The cutter is unaffected by temperature, hydrostatic pressure, fluid movement, or pump pulsation, minimizing the risk of cutter failure.
- Knives are protected by the actuator until positioned for cutting and then are spring fed to ensure proper feeding, eliminating the possibility of the broken knives and miscuts that could result from overload.
- The cutter is completely releasable. This feature allows removal of the kelly for making connections or other operations without damage to the cutter.

Specifications

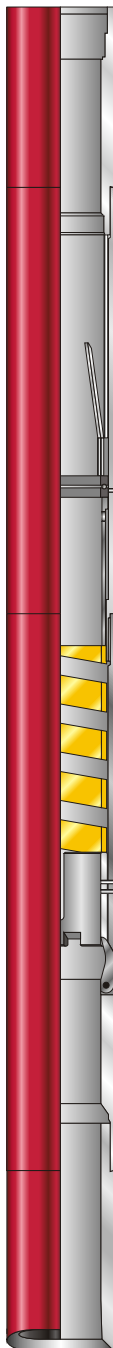
Nominal Size (in.)	OD (in./mm)	ID (in./mm)	Approximate Weight (lb/kg)	Tubular To Be Cut	Maximum Load (Bearing) (lb/kg)	Maximum Length of Tubing Cut (ft/m)	Maximum Cutting Load ^a (lb/kg)	Cutting Speed (RPM)	Approximate Cutting Time (min)
3-3/4	3.750 95.250	2.875 73.025	46 21	1- to 1/2-in. tubing	10,000 4,534	(2-in. EU) 1,000 454	2,000 907	20 to 100	1 to 5
4	4.125 ^b 107.775	3.188 80.975	53 24	1 1/2- to 2 3/8-in. EU or internal joint	15,000 6,804	(2-in. EU) 1,000 454	3,000 1,361	20 to 100	1 to 5
4-1/2	4.563 115.900	3.375 85.725	94 43	2 3/8-in. EU or internal joint	20,000 9,072	(2-in. EU) 1,500 680 (1 1/2-in. EU) 2,000 907	3,000 1,361	20 to 100	1 to 5
5-1/2	5.563 141.300	4.000 101.600	140 64	2 3/8- to 2 7/8-in. EU or internal joint	30,000 13,608	(2-in. EU) 1,000 454 (1 1/2-in. EU) 2,000 907	4,000 1,814	20 to 100	1 to 5

^a Maximum cutting load exceeds the weight of the fish.

^b Optional 4 1/16-in. OD



Type A Outside Cutter



Weatherford's type A outside cutter is designed to achieve the ultimate in external pipe cutting. Years of experience and depth of technical expertise have produced constant improvements, resulting in a tool that performs consistently and efficiently.

The cutter features a spring-fed control that eliminates the possibility of overloading cutter knives. This unique, controlled automatic compression feed minimizes shock and vibration on knives and makes cutting fast and smooth. A special hardened and ground ball-bearing assembly, positioned between the overshoot and knife pusher sleeve, ensures smooth, friction-free operation. After the cut is made, the cutter knives prevent the fish from falling by pivoting inward, beneath the cut pipe.

The cutter operates with three types of overshoot assemblies, including spring-dog type for collars or square shoulder joints; flipper-dog type for bottleneck joints; and slip-bowl type for joints with slight upset. Each of these overshoot assemblies serves to hold the cut pipe securely within the cutter after the cut is made.

Applications

- External cutting and recovery of tubing and drillpipe

Features, Advantages and Benefits

- Unique spring-feed design provides automatic weight control, eliminating the possibility of overload to prevent broken knives and miscuts.
- Ball-bearing assembly provides smooth, frictionless operation.
- Short, durable knife design ensures chatter-free performance, which reduces risk of knife breakage.
- The cutter operates with three types of overshoot assemblies, which hold the cut pipe securely within the cutter after the cut is made.

Specifications

Cutter				Standard Thread Connection
OD (in./mm)	ID (in./mm)	Weight (lb/kg)	Length (ft/m)	
4-1/8 104.775	3-1/8 79.375	59 27	3.67 1.118	Variable*
4-5/8 117.475	3-3/16 80.936	130 59	5.25 1.600	Variable*
5-7/16 138.113	4-1/4 107.950	141 64	5.50 1.676	Variable*
5-5/8 142.875	4-1/4 107.950	175 79	5.92 1.803	Variable*
6-1/16 153.988	4-7/8 123.825	146 66	5.00 1.524	Variable*
6-7/8 174.625	5-3/8 136.525	222 101	5.58 1.702	Variable*
7-1/2 190.500	5-7/8 149.225	287 130	5.92 1.803	Variable*
7-3/4 196.850	6-1/8 155.575	259 117	5.25 1.600	Variable*
8 203.200	6-1/2 165.100	238 108	5.08 1.549	Variable*
8-1/2 215.900	6-5/8 168.275	363 165	5.58 1.702	Variable*
9-3/4 247.650	7-7/8 200.025	479 217	6.75 2.057	Variable*

* Depends on washpipe work-string connection

Weatherford® Mechanical Internal Cutters

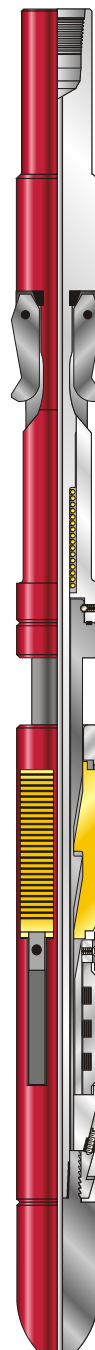
Weatherford offers both regular and spring-type internal cutters for cutting the full range of tubular goods, including tubing, drillpipe, and casing. Simple in principle and operation and exceptionally rugged, Weatherford's internal cutters enable safer, more efficient cutting.

Features, Advantages and Benefits

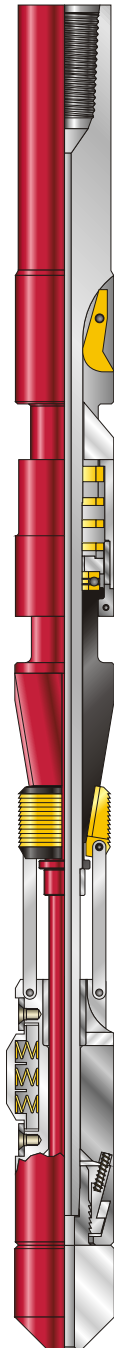
- Simple, rugged design provides reliable, efficient performance and ease of operation.
- Versatile application: One cutter can be used for both right- and left-hand operation
- Automatic bottom facilitates easy handling for resetting or removing the cutter or making additional cuts. Multiple cuts can be made in a single run, providing operational efficiency and saving rig time.

Specifications

Cutter			Designed to Cut
OD (in./mm)	Length (ft/m)	Weight (lb/kg)	
1-13/16 46.032	2.25 0.686	18 8	2 3/8-in. tubing
2 50.800	3.67 1.118	32 15	2 7/8-in. tubing
			2 7/8-in. IF drillpipe
			3 1/2-in. slim-hole
			3 1/2-in. IF drillpipe
2-1/4 57.150	2.67 0.813	30 14	2 7/8-in. tubing
2-7/16 61.925	3.25 0.991	42 19	3 1/2-in. tubing
			3 1/2-in. IF drillpipe
2-9/16 65.088	3.00 0.914	46 21	3 1/2-in. tubing
			4-in. tubing
2-11/16 68.263	4.00 1.219	64 29	4 1/2-in. IU drillpipe
3-1/4 83.550	3.25 0.991	67 30	4- to 4 1/2-in. tubing
			4 3/4-in. casing
3-1/2 88.900	4.67 1.422	110 50	4 1/2-in. IF drillpipe
			5-in. IU drillpipe



Type C Internal Cutters



Weatherford's type C internal cutters are configured in three- and five-knife assemblies for internal mechanical cutting of 5- through 10 3/4-in. casing. Each size cutter is designed to cut casing of two or more sizes.

Type C cutters can be used with either a conventional weight sleeve or a wedge block spring to maintain even, constant pressure on the knives, regardless of weight applied to the fishing string. The cutters can be run alone or with a spear to recover fish after cutting. Simple in principle and operation and exceptionally rugged, they perform reliably in a full range of casing cutting operations.

Features, Advantages and Benefits

- An automatic bottom facilitates resetting or removing the cutter or making additional cuts.
- Type C internal cutters are simple in design and operation for reliability and operational efficiency.
- Each size cutter can be used to cut multiple sizes of casing, enhancing operational efficiency.
- Slips are well protected during running and tripping to reduce wear and replacement.
- Cutters can be used with either a weight sleeve for conventional cutting or a wedge block spring, which maintains constant weight on the cutter knives, regardless of weight on the fishing string. This advantage optimizes cutting performance.

Specifications

Size of Casing to Be Cut (in.)	Cutter		
	OD (in./mm)	Length (ft/m)	Approximate Weight (lb/kg)
5 to 6	3-3/4	5.33	141
	95.25	1.6	64
6-5/8 and 7	5-3/4	5.75	288
	146.05	1.8	116
7-5/8 and 8-1/8	6-1/4	6.25	379
	158.75	1.9	172
8-5/8 to 10-3/4	7-1/4	6.33	514
	184.15	1.9	232
9-5/8 and 10-3/4	8	6.33	643
	203.20	1.9	292

Box Taps

Weatherford's box taps are used to tap threads into the steel of a fish so that it can be retrieved. Box taps are not releasable and should be used only when conventional fishing tools and releasing overshots do not offer a feasible solution. Available in a wide variety of sizes and connections, box taps should always be run with a safety joint and bumper sub.

Applications

- Fishing tubulars, bridge plugs, packers, and other downhole equipment when conventional releasing overshots cannot be used

Features, Advantages and Benefits

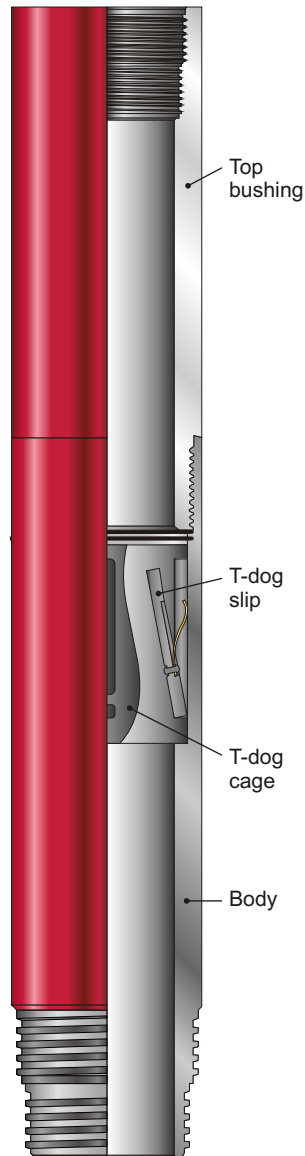
- Buttress or V-type wickers, with straight or fluted profiles, for easier tapping onto the fish
- Carburized wickers for greater surface hardness and core strength
- Available with right-hand wickers for standard operations or left-hand wickers for backing off the fish
- Integral lower-end guide for ensuring proper engagement, even with fish not centered in the hole
- Various sizes, lengths, and connections available to accommodate almost any size or type of fish

Ordering Instructions

1	Connection size and type
2	Type of thread (buttress or V)
3	Maximum ID of threads
4	Minimum ID of threads
5	Length
6	OD of oversize guide



T-Dog Overshot



Weatherford's T-dog overshot is used for one-trip recovery of mud-stuck or sanded up square-shouldered, collared tubing. With box x pin washpipe connections, the T-dog overshot can be run anywhere in the washover string, although it is usually run directly above the rotary shoe. The spring-loaded overshot has multiple catch and release capabilities and is easily released without sustaining damaged.

Features, Advantages and Benefits

- Windowless body allows washover and one-trip recovery of tubing.
- T-dog cage design allows tubing couplings to pass unrestricted through the tool to allow multiple joints for washover.
- T-dogs are spring-loaded for automatic catch position and simple release of the tool to minimize the chance of damage to the tool.

Specifications

- The T-dog overshot is available in 3 7/8-, 4 5/8-, 5 3/4-, and 8 1/8-in. washpipe sizes. Other sizes are available on request.

Overshot High-Pressure Packoff

Weatherford's overshot high-pressure packoff is used to obtain higher pressures (to 5,000 PSI/344.7 bar) so that fluids can be circulated through a fish or to temporarily or permanently patch damaged tubing. With a simple design of only packing and packing retainer rings, the packoff is a compatible accessory for popular sizes of overshots.

Applications

- High-pressure fluid circulation
- Tubing patch applications

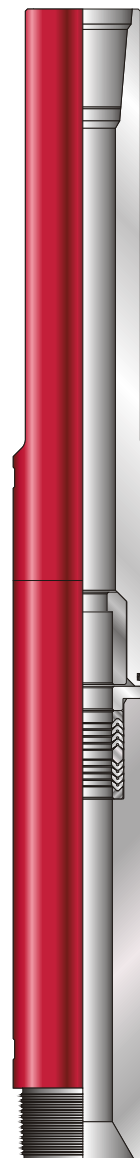
Features, Advantages and Benefits

- The packoff withstands the higher pressures sometimes required to gain circulation.
- Packing is corrosion-resistant.

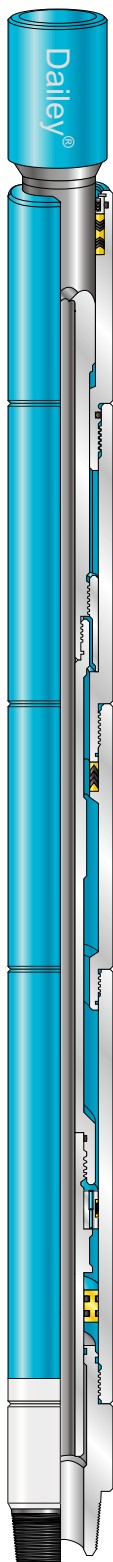
Specifications

Overshot Bowl OD* (in.)	Part Numbers			
	Overshot Complete Assembly	Overshot Bowl	Overshot Top Sub	Overshot Grapple
4-1/8	9105	9107	9106	1741
	C-5115	B-5117	A-5116	B-5120
4-1/4	C-5126	B-5128	A-5127	B-4627
4-3/8	9635	9637	9636	4195
	C-5112	B-5114	A-5113	B-3205
	C-4619	B-4621	A-4620	B-3607
4-1/2	C-5123	B-5125	A-5124	B-3359
4-9/16	C-5151	B-5153	A-5152	B-4339
4-11/16	9109	9111	9110	6662
4-13/16	C-4732	B-4734	A-4733	M-164
5-3/4	8975	8977	8976	6112
8-1/8	9217	9219	9218	9222

* Other sizes are available on request.



Dailey® HyPulse Jar Slinger®



The Weatherford® *Dailey HyPulse Jar Slinger* is a rugged, dependable downhole tool designed specifically for running with the *Dailey* hydraulic fishing jar. The slinger uses a compressible synthetic fluid as a spring for storing energy, which is released when the tripping mechanism in the *Dailey* hydraulic fishing jar opens. This action allows the internal mandrel-hammer assembly of the fishing jar to accelerate unimpeded until it strikes the anvil, resulting in a sharp upward impact to the stuck point.

The slinger can be used in deep, deviated, high-temperature holes to ensure optimal performance of the hydraulic fishing jar. The slinger is the best solution for situations requiring a store of energy beyond that supplied by the stretch of the fishing string, such as shallow-depth operations in which larger drill collars or drillpipe are being used.

In deviated and horizontal holes, the slinger can counteract the drag induced by wall contact on the heavyweight pipe or drill collars used above the hydraulic fishing jar.

The slinger allows the operator to use fewer drill collars in the fishing string.

The slinger reduces the shock impact on the fishing string above its point of installation, thereby reducing shock on the surface equipment. This advantage is highly beneficial on rigs equipped with top drives.

Applications

- All fishing, coring, washover, and other applications that require delivery of an upward impact to a stuck point, tight spot, or breakage of a core before retrieval from the wellbore
- Fishing operations that require a store of energy beyond that supplied by the stretch of the stuck fishing string
- Fishing operations in deviated and horizontal holes

Features, Advantages and Benefits

- The tool is designed to reach total stroke at maximum overpull to provide a nearly constant amplification factor across a large range of overpulls with the maximum impact taking place at maximum overpull.
- The internal hammer bottoms out at maximum overpull to provide mechanical overpull protection and prevent accidental damage to the tool.
- Rugged, durable construction provides reliability and longer tool life.
- Slinger reduces costs associated with shock to surface equipment.
- Single-piece involute spline provides maximum torque capacity with minimal backlash.
- Fluid-isolated high-pressure chamber protects against formation cuttings, sand, and other downhole debris.

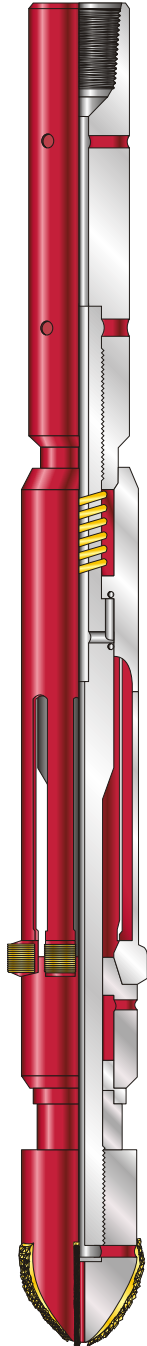
Dailey® HyPulse Jar Slinger®

Specifications

OD (in./mm)	ID (in./mm)	Tool Joint Size (SPL)	Tensile Yield* (x 1,000 lb) (x 1,000 N)	Torsional Yield* (x 1,000 lb/ft) (x 1,000 N•m)	Length Closed (ft-in./m)	Weight (lb/kg)	Total Stroke (in./mm)	Maximum BHT (°F/°C)	Pump Open Area (in. ² /cm ²)
1-13/16 46	1/2 13	1-13/16 WFJ	75 334	1.6 2.2	7 ft, 0 in. 2.1	50 23	5-1/2 140	400 204	1.1 7.1
2-1/4 57	11/16 18	1-1/4 Reg.	110 489	2.5 3.4	8 ft, 9 in. 2.7	100 45	6 152		0.8 5.2
3-1/8 79	1-1/4 32	2-3/8 Reg.	250 1,112	5.0 6.8	9 ft, 10 in. 3.0	198 90	6-1/8 156		2.4 15.5
	1-1/2 38	2-7/8 Reg.	200 890			175 79	6 152		2.8 18.1
3-3/4 95	1-3/4 45	2-7/8 IF	275 1,223	7.8 10.6	9 ft, 8 in. 2.9	242 110	6-1/8 156		4.4 28.4
	1-15/16 49	2-3/8 EUE	225 1,001	3.75 5.1	9 ft, 10 in. 3.0	224 102			4.4 28.4
4-1/4 108	1-15/16 49	2-7/8 IF	350 1,557	15 20.3	9 ft, 10 in. 3.0	340 154	6-1/8 156		4.9 31.6
	2-1/8 54				10 ft, 0 in. 3.0	316 143	6-1/4 159		5.4 34.8
4-3/4 121	2-1/4 57	3-1/2 IF	500 2,224	20 27.1	9 ft, 10 in. 3.0	400 181	7 178		6.5 41.9
6-1/4 159	2-1/4 57	4-1/2 IF	832 3,701	49.3 66.8	13 ft, 6 in. 4.1	1,000 454	8-1/4 210		7.7 49.7
6-1/2 165	2-3/4 70	4-1/2 IF	1,000 4,448	56.2 76.2	15 ft, 0 in. 4.6	1,200 544	8-1/2 216		11.0 71.0
7-3/4 197	3 76	6-5/8 Reg.	1,600 7,117	100 135.6	15 ft, 7 in. 4.7	2,000 907	9-3/4 248		14.2 91.6
8 203	3 76	6-5/8 Reg.	1,600 7,117	105 142.4	15 ft, 6 in. 4.7	1,800 817	9-3/4 248		14.2 91.6

*Tensile and torsional values are calculated per API RP7G based on nominal dimensions and the published yield strength of the material and do not constitute a guarantee, actual or implied.

Hydraulic-Release Packer Retrieval Spear



The Weatherford hydraulic-release packer retrieval spear is the simple, effective solution for retrieving drillable production packers. Manufactured from high-quality alloy steels, the hydraulic-release packer retrieval spear performs optimally even under the harshest, most challenging conditions.

The shear-out feature enables pulling the tool in the event of pressure loss. A jarring tool may be required above the spear if pulling through a highly deviated hole.

Applications

- Retrieval of drillable production packers from 2.5 in. to 6.0 in. packer bore

Features

- Shear-in ring mechanism locates position of packer in casing.
- Shear-out ring mechanism allows removal from stuck packer.
- Non-rotating grapple, positioned below the packer, ensures catching the packer if dropped after milling is complete.
- Hydraulic release allows repeated releases without coming out of the hole.

Benefits

- Tool cannot be accidentally disengaged.
- Non-rotating grapple facilitates milling operation.
- Mechanical shear-out feature allows hydraulic tool removal even in the event of pressure loss.

Specifications

For Packer ID (in./mm)	OD (Top Sub) (in.)	ID (in./mm)	Standard Thread Connection (in.)	Assembly Number
2.500 to 3.250 63.50 to 82.55	2.423 61.54 2.438 61.93	0.250 6.350	2-3/8 HOMCO FJ 2-1/4. PRT 1-1/4 API Reg.	PRH250325
2.500 to 3.250 63.50 to 82.55	3.125 79.38	0.250 6.350	2-3/8 API Reg.	PRH250325
3.250 to 3.875 82.55 to 98.43	3.125 79.38	0.375 9.525	3-1/8 PRT	PRH325388
3.500 to 4.000 88.90 to 101.60	3.375 85.73	0.375 9.525	3-1/8 PRT 2-3/8 API Reg.	PRH350425
4.000 to 4.875 101.60 to 123.83	3.875 98.43	0.500 12.700	3-1/8 PRT 2-7/8 API Reg.	PRH400488
4.750 to 6.000 120.65 to 152.40	4.625 117.48	0.625 15.875	4-1/4 PRT 3-1/2 API Reg.	PRH475600

* When ordering, please specify packer ID, preferred shear-out values, and top connection. Casing size and weight, type of mill/shoe and extension sub lengths.

Rotatable Packer Retrieval Spear

The Weatherford rotatable packer retrieval spear is the simple, effective solution for retrieving drillable production packers. Manufactured from high-quality alloy steels, the rotatable packer retrieval spear performs optimally even under the harshest, most challenging conditions.

Applications

- Retrieval of drillable production packers from 2.313- to 6-in. packer bore

Features

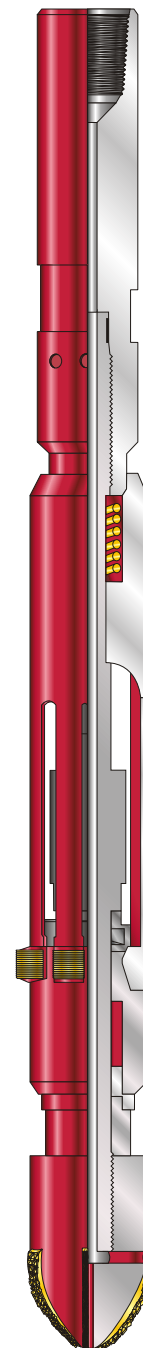
- Shear-in ring mechanism locates position of packer in casing
- Shear-out ring mechanism allows removal from stuck packer
- Non-rotating grapple
- Grapple positioned below the packer, ensures catching the packer if dropped after milling is complete

Benefits

- Tool cannot be accidentally disengaged
- Non-rotating grapple facilitates milling operation

Specifications

Catch Sizes For Packer ID (in./mm)	OD (Top Sub) (in./mm)	ID (in./mm)	Standard Thread Connection (in.)	Assembly Number
2.313 to 2.688 58.75 to 68.28	2.235 56.77 2.250 57.15	0.250 6.350	2-1/4 PRT NC 16 BOX	PR231269
2.500 to 3.250 63.50 to 82.55	2.423 61.54 2.438 61.93	0.250 6.350	2-3/8 HOMCO FJ 2-1/4 PRT 1-1/4 API Reg.	PR250325
2.500 to 3.250 63.50 to 82.55	3.125 79.38	0.250 6.350	2-3/8 API Reg.	PR250325
3.250 to 3.875 82.55 to 98.43	3.125 79.38	0.375 9.525	3-1/8 PRT	PR325388
3.500 to 4.000 88.90 to 101.60	3.375 85.73	0.375 9.525	3-1/8 PRT 2-3/8 API Reg.	PR350425
4.000 to 4.875 101.60 to 123.83	3.875 98.43	0.500 12.700	3-1/8 PRT 2-7/8 API Reg.	PR400488
4.750 to 6.000 120.65 to 152.40	4.625 117.48	0.625 15.875	4-1/4 PRT 3-1/2 API Reg.	PR475600



Slick-Bore Packer Retrieval Spear



The Weatherford slick-bore packer retrieval spear is the simple, effective solution for retrieving drillable production packers with tailpipe assemblies in the absence of a shoulder at the packer base. Manufactured from high-quality alloy steels, the slick-bore packer retrieval spear performs optimally even under the harshest, most challenging conditions.

Applications

- Retrieval of drillable production packers from 3.25- to 6-in. packer bore

Features

- Overpull for shear-out in the event of stuck packer
- Retrieves Slick Bore Packer Assemblies

Benefits

- Tool cannot be accidentally disengaged.
- Non-rotating grapple facilitates milling operation.

Specifications

Catch Sizes For Packer ID (in./mm)	OD (Top Sub) (in./mm)	ID	Standard Thread Connection (in.)	Assembly Number
3.250 to 3.875 82.55 to 98.43	3.125 79.38	SOLID	3-1/8 PRT 2-3/8 API Reg.	PRS325388
4.750 to 6.000 120.65 to 152.40	4.250 107.95	SOLID	4-1/4 PRT	PRS475600

* When ordering, please specify packer ID, preferred shear-out values, top connection and preferred stroke length. Casing size and weight, type of mill/shoe and extension sub lengths.

Simplex Packer Retrieval Spear

The Weatherford Simplex Packer Retrieval Spear is an internally engaging fishing tool designed for retrieving drillable production packers. In a single trip, the Simplex Packer Retrieval Spear and its accessory components pass through the bore of the packer, prevent loss of the packer during milling, and pull the packer after milling. If necessary, the Simplex Packer Retrieval Spear can be released and reset to catching position without ever coming out of the hole.

Applications

- Retrieval of all types and sizes of drillable production packers from the wellbore

Features

- Tool consists of top sub, lock pin, cage, mandrel, and bottom nut
- Top sub allows connection to stinger or extension
- Removable bullnose-type bottom nut allows use of alternative nut or tool
- Cage has J-slots with internal-lug keyways, friction wickers, lifting shoulder, and tapered inside diameter (ID) with milled slots to allow expansion of the lifting shoulder
- J-slot lugs and tapered cone of the mandrel enable the cage lifting shoulder to expand

Benefits

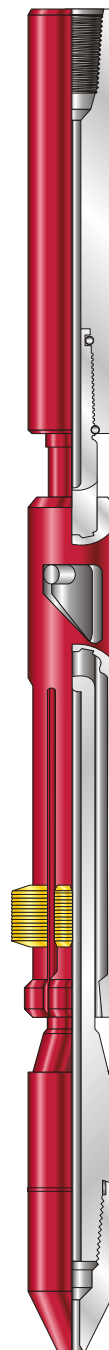
- Prevents loss of the packer during milling
- Enables single-trip packer retrieval
- Enables high-velocity jetting if packer has been sanded over

Specifications

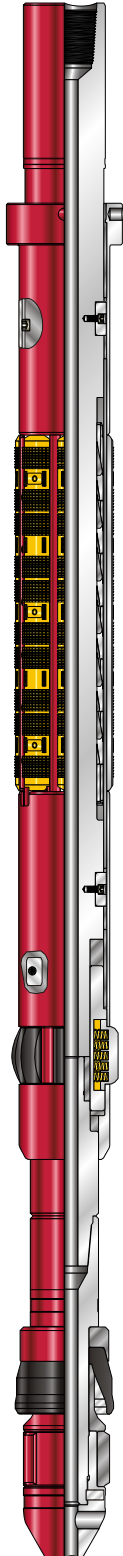
Catch Sizes For Packer ID (in./mm)	Extra Part to Catch (in./mm)	OD (Top Sub) (in./mm)	ID (in./mm)	Standard Thread Connection	Weight (lb/kg)	Mandrel Tensile Strength* (lb/N)	Assembly Number
1.968 49.99	2.000 50.80	1.813 46.05	0.250 6.350	1-13/16 Wilson FJ	14 6.4	67,000 298,031	69035
2.375 60.33	2.390 to 2.550 60.71 to 64.77	2.250 57.15	0.375 9.525	1-13/16 Wilson FJ	20 9.1	70,600 314,044	69040
2.688 68.26	2.750 to 3.200 69.85 to 81.28	2.563 65.09	0.500 12.700	2-3/8 Wilson FJ	23 10.4	119,500 531,563	69045
3.250 82.55	3.500 to 4.000 88.90 to 101.60	3.125 79.38	0.625 15.875	2-3/8 API Reg.	28 12.7	213,300 984,806	69050
3.875 98.43	4.000 to 5.000 101.60 to 127.00	3.750 95.25	0.750 19.050	2-7/8 API Reg.	35 15.9	349,250 1,553,542	69055

*Strengths shown are theoretical calculations based on yield strength of the material used in each case and are accurate only to plus or minus 20 percent. These figures do not constitute a guarantee, actual or implied, and are meant to serve only as a guide. For safety reasons, appropriate allowance must be made in actual use as a safety factor.

Note: When ordering specify name and number of assembly or part and make, model, and ID of packer to be retrieved.



DwC™ Internal Casing Drive System



The Weatherford Drilling with Casing (DwC) Internal Casing Drive System is designed for quick attachment into, and release from, the casing drill string to improve connection times when drilling with casing. The System can handle a single joint of casing, in most cases, and can drive a string of casing to depths of 15,000 ft, without damage to the casing.

Applications

- Drives casing of 9 5/8- to 13 3/8-in. to depths of 15,000 ft
- Drives casing of 16- to 20-in. to depths of 5,000 ft
- With simple modifications, converts to fishing spear

Features, Advantages and Benefits

- Straight forward design for reliable performance
- Quarter right-hand-turn catch
- Quarter left-hand-turn release
- Stop collar for facilitating proper slip placement inside casing
- High-pressure packoff
- Bidirectional wickers
- Left- or right-hand torque capability
- Optional mud saver valve
- Reliable performance
- Quick and easy rig-up
- Non-damaging to casing if operated within guidelines
- Rapid make-up for minimizing connection time
- Easy positioning into casing joint

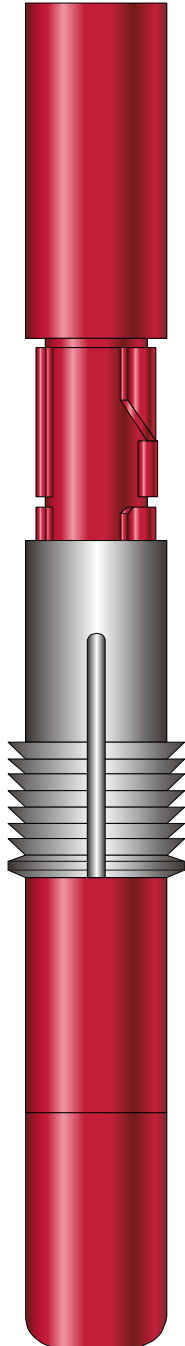
DwC™ Internal Casing Drive System

Specifications

Casing		Part Number	
OD (in.)	Weight (lb/ft)	Spear Assembly	Pack-Off Assembly
9-5/8	36.00	743306	743354
	38.00		
	40.00		
	42.00		
	43.50		743355
	47.00		
	53.50		
	57.40		
10-3/4	58.40	715994	743356
	40.50		
	45.00		
	45.50		
	48.00		
	51.00		
13-3/8	54.00	715995	743357
	55.50		743358
	48.00		
	54.50		
	61.00		
	68.00		
	72.00		

Casing		Part Number	
OD (in.)	Weight (lb/ft)	Spear Assembly	Pack-Off Assembly
16	63.39	230043	743360
	65.00		743361
	70.00		
	75.00		
	84.00		743362
	84.00		743363
	94.50		743365
	95.00		743366
	109.00		
	118.00		
	128.00		743367
	138.00		743368
18-5/8	73.09	234591	743370
	73.09		743371
	78.00		743372
	87.50		
	94.50		
	96.50		743373
	97.70		743374
	99.00		
	105.00		
	109.00		743376
	112.00		743377
	115.00		
	122.00		
	126.00		743379
	126.00		743380
	133.00		
	138.00		
20	84.75	234592	743381
	85.60		743383
	90.00		
	94.00		
	104.10		
	106.50		743384
	118.50		743385
	131.00		743387
	133.00		
	141.90		743388

H-E Packer Retrieval Spear



The Weatherford H-E Packer Retrieval Spear (PRS) removes drillable full-bore production packers. Even after milling through the packer, the PRS remains in proper catching position to engage the lower end of the packer. The tool is releasable with right-hand control of the drill pipe and can be re-engaged in the packer by simply lowering through the packer again.

Applications

- Removal of drillable full-bore production packers

Features

- Rugged, simple design
- Only three components: top coupling, mandrel, and slip
- Option bull plug available
- Tungsten carbide dressing available on bull plug

Benefits

- Saves time

Specifications

Tool Model	PRS 090	PRS 100	PRS 200	PRS 300	PRS 400
Assembly Number	14079	14080	14081	14082	14083
Nominal Size (in./mm)	1-1/4 31.75	1-13/16 46.04	2 50.80	2-1/2 63.50	3 76.20
Catch Sizes for Packer ID (in./mm)	1.250 to 1.531 31.75 to 38.89	1.791 to 2.370 45.49 to 60.20	2.468 to 3.250 62.69 to 82.55	3.000 to 4.250 76.20 to 107.95	3.938 to 5.000 100.03 to 127.00
Total OD (in./mm)	1-3/16 30.16	1-3/4 44.45	2-3/8 60.33	2-3/4 69.85	3-1/2 88.90
Total ID (in./mm)	0.250 6.350	0.375 9.525	0.375 9.525	0.500 12.700	0.750 19.050
Tool Length (in./mm)	18 457.2	26 660.4	34 863.6	34 863.6	36 914.4
Tool Weight (lb/kg)	8 3.6	12 5.4	36 16.3	49 22.2	74 33.6
Standard Box Connection (in.)	Optional	1-13/16 WFJ-OS	1-1/4 API Reg.	2-3/8 WFJ	2-3/8 API Reg.
Standard Pin Connection (in.)					
Standard Tool Joint (in.)					
Maximum Tool Joint Tensile Yield (lb/N)	100,000 444,822	100,000 444,822	187,000 831,818	138,000 613,855	381,000 1,694,773
Tool Joint Torque Load at Yield (ft/lb, N·m)	1,600 2,169	1,600 2,169	4,400 5,966	4,490 6,088	5,340 7,240
Maximum Tensile Yield (lb/N)	2,700 12,010	5,300 23,576	93,000 413,685	143,000 636,096	198,000 880,748
Maximum Torsional Yield (ft/lb, N·m)	338 458	1,036 1,405	2,260 3,064	3,900 5,288	4,380 5,938

H-E Packer Retrieval Spear

Replacement Parts

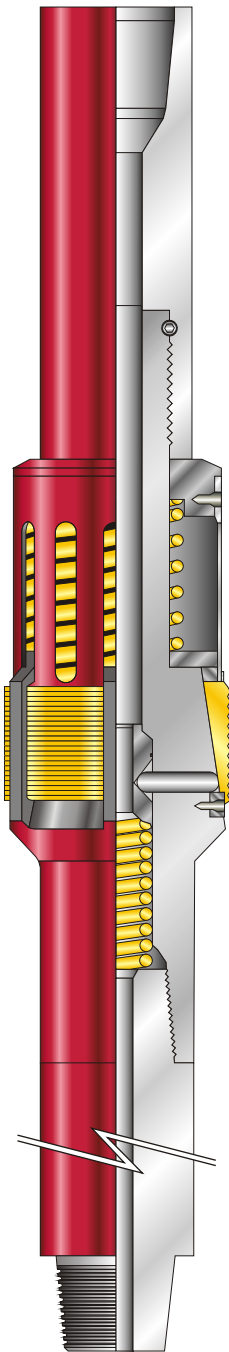
Top Coupling	Part Number	214920	213367	213385	213407	213423
	Number Required	1	1	1	1	1
Mandrel	Part Number	213358	213375	213397	213415	213432
	Number Required	1	1	1	1	1
Bull Plug	Part Number	—	113256	113258	113260	113262
	Number Required	—	1	1	1	1

Optional Slips

Part No.	213355	213374	213386	213408	213424
To Catch	1.250	1.791	2.468	3.000	3.938
Part No.	213356	213509	213387	213409	213425
To Catch	1.375	1.812	2.500	3.250	4.000
Part No.	213357	213368	213395	213410	213426
To Catch	1.531	1.875	2.550	3.500	4.250
Part No.	—	213510	213388	213411	213427
To Catch	—	1.9375	2.625	3.750	4.400
Part No.	—	213369	213389	213412	213428
To Catch	—	1.968	2.688	3.875	4.500
Part No.	—	213370	213390	213413	213429
To Catch	—	2.000	2.750	4.000	4.750
Part No.	—	213371	213391	213414	213430
To Catch	—	2.188	2.811	4.250	4.875
Part No.	—	213372	213392	214739	213431
To Catch	—	2.250	2.875	3.625	5.000
Part No.	—	213373	213393	—	216831
To Catch	—	2.370	3.000	—	6.000
Part No.	—	215369	213396	—	—
To Catch	—	2.313	3.200	—	—
Part No.	—	—	213394	—	—
To Catch	—	—	3.250	—	—

Complete assembly includes the smallest catch slip available. When ordering larger sizes, please specify slip catch size desired, and make, model and ID of packer to be caught. Box and pin connection must be specified on Assembly 14079. Non-standard threads on other assemblies must be specified. Recommended spares = one slip for each catch size.

Hydraulic Casing Spear



Weatherford's hydraulic casing spear enables single-trip cutting and recovery of casing without stripping the drillpipe from the casing at the rotary table. In a typical casing cutting procedure, the cutting assembly is run in the wellbore to the desired cutting depth, and the cut is made with a Weatherford A1 casing cutter. The assembly is pulled to just below the casing hanger, the spear is activated, and the casing is pulled free to the rotary table. The spear is then released, the cutting assembly is laid down, and casing lay-down operations can begin.

Features, Advantages and Benefits

- Hydraulic activation and an easy-release mechanism simplify operation of the casing spear, increasing operational efficiency.
- Casing is cut and recovered in one trip, saving rig time.
- The hydraulic casing spear eliminates the need to strip drillpipe from the casing at the rotary table, minimizing the safety issues associated with this operation.

Specifications

Casing OD (in.)	Casing Weight (lb/ft)	Casing Spear OD (in./mm)	Connections
7	29.0 to 35.0	5.750 146.050	3 1/2-in. IF
9-5/8	29.3 to 40.0	8.656 219.862	6 5/8-in. Reg.
	43.5 to 59.4	8.250 209.550	
10-3/4	40.5 to 55.5	9.594 252.832	6 5/8-in. Reg.
	60.7 to 79.2	9.125 231.775	
	85.3 to 97.1	8.656 219.862	
13-3/8	48.0 to 68.0	12.250 311.150	6 5/8-in. Reg.
	61.0 to 85.0	12.000 304.800	

Hollow Pin Tap

Weatherford hollow pin taps are designed specifically for screwing into a joint of washpipe that has twisted off with a fish protruding from the top. Hollow pin taps are manufactured in all washpipe sizes and connection types. Having the same inside diameter (ID) as the washpipe connections, hollow pin taps can screw into washpipe that has twisted off over the maximum washover size.

Applications

- Screwing into washpipe that has twisted off with a fish protruding from the top

Features

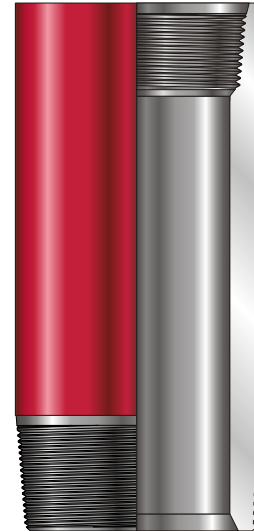
- Available in all washpipe sizes and connection types
- Manufactured from AISI 4140 heat-treated alloy steel
- Buttress or V-type wickers
- Carburized wickers for greater surface hardness and core strength
- Available with right- or left-hand wickers
- Available with straight or fluted wicker profile

Benefits

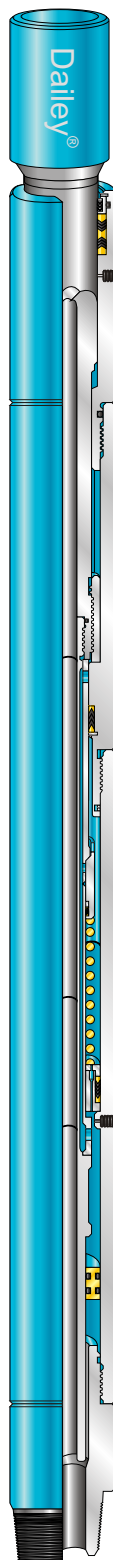
- Solution for special fishing challenges
- Variety of sizes and connection types

Specifications

- Available in all washpipe sizes and connection types



Dailey® Hydraulic Fishing Jar



The Weatherford® *Dailey* hydraulic fishing jar, with a patented combination time-delay/mechanical trigger system, is a rugged tool for fishing applications. The jar combines reliability and long operating life under a wide range of fishing conditions and environments.

The jar features a one-piece involute spline for maximum torque capacity with minimal backlash. A fluid-isolated high-pressure chamber lubricates and isolates the moving seals, impact shoulders, and mandrel of the jar from the destructive effects of formation cuttings, sand, and other downhole debris.

Its unique design allows use of this jar in deep, deviated, high-temperature holes without compromising performance. The jar delivers virtually the same time delay in deep, hot holes as it does on the surface.

The jar does not generate internal heat during jarring periods; therefore, this design feature enables uninterrupted jarring without waiting for the jar to cool down or for the viscosity of the oil to return to normal. Elimination of heat build-up also extends packing and seal life as well as the time the jar can remain downhole.

The design also eliminates the need for bleed-off compensation; the trip load at the jar will be the same as set at surface.

With large free-flow paths, the jar can be re-set as fast as the string can be lowered, without damage to the internal seals or bursting of any body housings. Re-setting does not require pre-loading—only enough weight to overcome internal seal friction.

The jar requires only axial manipulation of the string. The rugged involute spline system prevents downhole torque from interfering with the tripping times of the jar.

Overpull to the jar is infinitely variable within the overpull limits established for the jar size. This feature gives the operator complete control of the impact to the fish by simply adjusting the pull on the string.

Jarring load is controlled and varied at the surface by overpull: the greater the overpull, the faster the jar trips and the higher the impact loads achieved.

Applications

- All fishing, coring, washover, and other applications that require delivery of an upward impact to a stuck point, tight spot, or breakage of a core before retrieval from the wellbore.

Features, Advantages and Benefits

- Rugged construction for reliability and longer tool life
- Hydraulic time delay for reliability under a wide range of conditions and environments
- Mechanical trigger for durability
- Single-piece involute spline for maximum torque capacity with minimal backlash
- Fluid-isolated high-pressure chamber for protection against formation cuttings, sand, and other downhole debris
- Elimination of the need for bleed-off compensation, simplifying operation
- Elimination of internal heat generation for uninterrupted jarring, longer packing and seal life, and longer downhole time

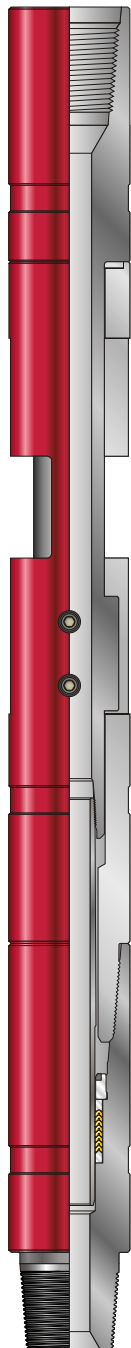
Dailey® Hydraulic Fishing Jar

Specifications

OD (in./mm)	ID (in./mm)	Tool Joint Size (API)	Tensile Yield* (x 1,000 lb) (x 1,000 N)	Torsional Yield* (x 1,000 lb/ft) (x 1,000 N•m)	Maximum Jar Load (x 1,000 lbt) (x 1,000 N)	Length Closed (ft/m)	Weight (lb/kg)	Free Travel (in./mm)	Total Stroke (in./mm)	Maximum BHT (°F/°C)	Pump Open Area (in. ² /cm ²)
1-13/16 46	1/2 13	1-13/16 WFJ	75 334	1.6 2.2	20 89	7.0 2.1	50 23	4 102	5-1/2 140	400 204	1.1 7.1
2-1/4 57	11/16 18	1-1/4 Reg.	110 489	2.5 3.4	30 133	7.8 2.4	80 36	4 102	6 152		1.8 11.6
3-1/8 79	1-1/4 32	2-3/8 Reg.	250 1,112	5.0 6.8	45 200	9.0 2.7	180 82	4-1/8 105	6-1/8 156		4.0 25.8
	1-1/2 38	2-7/8 PAC.	200 890		35 156	8.7 2.6	180 82	4 102	6 152		4.0 25.8
3-3/4 95	1-1/2 38	2-3/8 IF, EUE	328 1,459	9.5 12.9	66 294	10.5 3.2	280 127	4-1/4 108	6-1/8 156		5.9 38.1
	1-3/4 44	2-3/8 IF	260	7.8	45	9.0 2.7	222 101				
	1-15/16 49	2-3/8 EUE	1,157	10.6	200	10.0 3.0	230 104				
4-1/4 108	2-1/8 54	2-7/8 IF	325 1,446	15 20.3	55 245	9.0 2.7	290 132	4-1/4 108	6-1/8 156		7.7 49.7
4-3/4 121	2-1/4 57	3-1/2 IF	500 2,224	20 27.1	85 378	9.9 3.0	400 181	5 127	7 178		10.3 66.5
6-1/4 159	2-1/4 57	4-1/2 IF	1,000 4,448	49.3 66.8	200 890	12.2 3.7	800 363	6 152	8-1/4 210		15.9 102.6
6-1/2 165	2-3/4 70	4-1/2 IF	1,000 4,448	56.2 76.2	175 778	12.8 3.9	1,100 499	6-1/2 165	8-1/2 216		19.6 126.5
7-3/4 197	3 76	6-5/8 Reg.	1,600 7,117	100 135.6	260 1,157	14.0 4.3	1,850 839	7-1/2 191	9-3/4 248		28.3 182.6
8 203	3 76	6-5/8 Reg.	1,600 7,117	105 142.4	300 1,334	15.5 4.7	2,000 907	7-1/2 191	9-3/4 248		28.3 182.6

*Tensile and torsional values are calculated per API RP7G based on nominal dimensions and the published yield strength of the material and do not constitute a guarantee, actual or implied.

J-Type Safety Joints



The J-type safety joint is usually run in conjunction with non-releasing fishing tools, such as taper or box taps, to provide a positive means of releasing and re-engaging the tools. The safety joint is also used in washover operations to engage fish that have been washed over, making it possible to release the wash pipe from the fish if the fish cannot be pulled freely from the wellbore.

The J-type safety joint consists of two components. The top half contains the engaging lugs; the bottom half has J-slots. Shear screws are used to keep the safety joint together until the fish is engaged and an overpull is taken to shear them.

Applications

- Releasing and re-engaging otherwise non-releasable fishing tools
- Releasing from fish with washpipe in washover operations

Features, Advantages and Benefits

- Simple two-piece construction simplifies makeup and operation to save time.
- Shear screws prevent accidental release of the safety joint before engagement of the fish, saving the cost of lost equipment or an additional fishing operation.
- Tool reduces risk when using non-releasing fishing tools.
- Tool provides unlimited connect and disconnect capability of fishing string and stuck fish for operational flexibility.

Specifications

Connection	Assembly with Packoff	Safety Joint						Packoff Sub	
		Maximum OD (in./mm)	Minimum ID (in./mm)	Shear Screws		Lugs			
				Number	Shear Value Each (lb/kg)	Tensile Yield (lb/kg)	Torsional Yield (ft-lb/N·m)	ID (in./mm)	Pressure Rating (PSI/bar)
2 7/8-in. API IF	1152041300	4-1/8 104.800	1-5/8 41.150	4	10,000 4,536	264,000 119,748	10,560 14,317	1-5/8 41.275	5,000 344.7
3 1/2-in. API IF	1152047500	4-3/4 120.700	1-5/8 41.150	4	10,000 4,536	330,000 149,686	12,320 16,704	1-5/8 41.275	5,000 344.7
4 1/2-in. X-Hole	1152062509	6-1/4 158.800	2 50.800	4	10,000 4,536	704,000 319,329	31,240 42,356	2 50.800	5,000 344.7
4 1/2-in. API IF	1152062500	6-1/4 158.800	2 50.800	4	10,000 4,536	704,000 319,329	34,320 46,532	2 50.800	5,000 344.7
4 1/2-in. API IF	1152063800	6-3/8 160.700	2 50.800	4	10,000 4,536	704,000 319,329	34,300 46,505	2 50.800	5,000 344.7
4 1/2-in. API IF	1152065000	6-1/2 165.100	2 50.800	4	10,000 4,536	704,000 319,329	34,300 46,505	2 50.800	5,000 344.7
5 1/2-in. API IF	1152067500	6-3/4 171.500	2-1/2 63.500	4	10,000 4,536	704,000 319,329	56,320 76,360	2-1/2 63.500	5,000 344.7

Options

- Left-hand release and right-hand API tool connections are standard. Right-hand release and/or left-hand API tool connections are available.
- A pack-off sub is available for circulation to the fish.

Washover Safety Joints

The Weatherford washover back-off safety joint is an easy-to-use safety joint which allows the recovery of the fishing string above the washover pipe in the event the washover pipe becomes stuck in washover operations. The washover back-off safety joint is easily backed off from surface, not requiring the use of a wireline string shot for backing off from stuck washpipe. With the washover back-off safety joint, washing over and backing off of a stuck drill string with wireline can be accomplished in a single trip, using a Weatherford J-type safety joint.

Applications

- Washover and back-off operations

Features

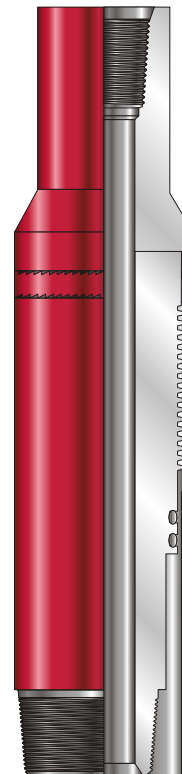
- Easy-to-use design
- Allows backing off from stuck washover pipe
- Easily backed off from surface
- Used in washover and back-off operations of stuck drill strings in conjunction with the Weatherford J-type safety joint

Benefits

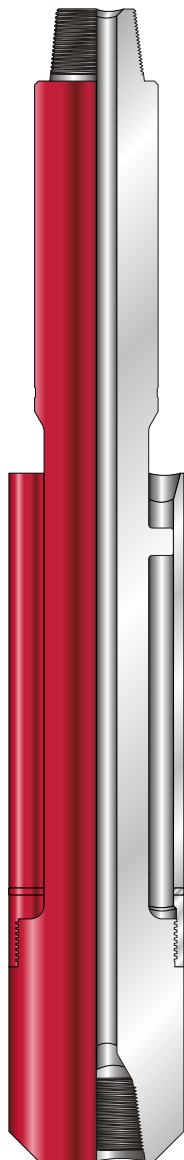
- Saves rig time
- Saves operator cost of backing off with wireline string shot
- Easy to operate
- Versatile

Specifications

- Available in most washpipe sizes and connection types



Screw-on-Skirt Boot Basket



The Weatherford screw-on-skirt boot basket catches debris and junk that is too heavy to circulate out of the wellbore. Designed for use in the drill collar string, just above a milling tool or drill bit, the boot basket consists of an oversized skirt screwed onto a steel mandrel with a left-hand thread. The screw-on skirt allows easy access to the mandrel for inspection of both skirt and mandrel.

Except in highly deviated holes, Weatherford recommends running two boot baskets in tandem to decrease the likelihood of junk bypassing a single basket.

Features, Advantages and Benefits

- Tandem operation of boot baskets increases junk-catching capacity for greater operational efficiency.
- Removable skirt enables quick and easy inspection of skirt and mandrel for more thorough tool inspection and maintenance.
- Integral skirt support ribs eliminate the need for welding the skirt or the mandrel, enhancing basket reliability.
- Standard box-down, pin-up connections enable running above a mill or drill bit.
- Drain holes in the skirt enable the wellbore fluids to drain after the boot basket is brought out of the hole to surface.

Specifications

Recommended Hole Size (in./mm)	Standard Skirt Diameter (in./mm)	Top and Bottom Connections (in./mm)	Overall Length (in./m)	Fishneck Diameter (in./mm)	Body Diameter Under Sleeve (in./mm)	Bore Diameter (in./mm)	Sleeve Length (in./mm)	Approximate Weight (lb/kg)
4-1/8 to 4-1/2 104.8 to 114.3	3-11/16 93.7	2-3/8 60.3	33 0.8	3-1/8 79.4	2 50.8	1 25.4	10-1/2 266.7	50 23
4-5/8 to 4-7/8 117.5 to 123.8	4 93.7	2-3/8 60.3	33 0.8	3-1/2 88.9	2 50.8	1 25.4	10-1/2 266.7	62 28
		2-7/8 73.0	37 0.9	4 101.6	2-1/2 63.5			66 30
5 to 5-3/4 127.0 to 146.0	4-1/2 114.3	2-7/8 73.0	37 0.9	4 101.6	2-1/2 63.5	1 25.4	10-1/2 266.7	91 41
5-7/8 to 6-3/8 149.2 to 161.9	5 127.0	3-1/2 88.9	38 1.0	4-5/8 117.4	3-1/4 82.5	1-1/2 38.1	10-1/2 266.7	120 54
6-1/2 to 7-3/8 165.1 to 187.3	5-1/2 139.7			5 127.0	3-1/4 82.5			144 65
7-1/2 to 8-1/2 190.5 to 215.9	6-1/2 165.1	4-1/2 114.3	48 1.2	6-1/2 165.1	4-1/4 107.9	2 50.8	10-1/2 266.7	261 118
	6-5/8 168.3							270 122
	6-3/4 171.5							280 127
8-5/8 to 9-5/8 219.1 to 244.5	7 177.8	6-5/8 168.3	50 1.3	7-1/2 190.5	5-1/2 139.7	3 76.2	10-1/2 266.7	298 135
	8-1/2 215.9							438 199
	8-5/8 219.1							451 205
11-1/2 to 13 292.1 to 330.2	9-5/8 244.5	7-5/8 193.7	51 1.3	8-1/2 215.9	7-1/2 190.5	2-13/16 71.4	17 431.8	529 240
14 to 17-1/2 355.6 to 444.5	10-3/4 273.1			9-5/8 244.5				806 366
	12-3/4 323.9			11 279.4				1,065 483

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Type H Junk Basket



The Weatherford type H junk basket efficiently recovers large fragments or objects from the hole, including core samples of congruous formations. A tungsten carbide-dressed shoe in the bottom of the basket mills oversize objects to recoverable sizes.

A pressure-relief bushing prevents abnormal increases in circulating pressure, which could wash out the junk or core. Flat-bottom shoes are standard, but optional toothed-type shoes are available. Both double- and single-catcher configurations are available.

Weatherford's type H junk basket is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Fishing large objects from the hole
- Retrieving core samples of congruous formations

Features

- Tungsten carbide-dressed rotary shoe for efficient milling
- Pressure-relief bushing for preventing abnormal increases in circulating pressure
- Standard flat-bottom shoe for cutting cores; optional toothed-type shoe for other applications
- Thrust bearing ball-bearing assembly for free rotation of the barrel and shoe around the catchers to minimize dog breakage
- Alternating long and short dogs (single-catcher configuration) for a close-fitting basket capable of retrieving smaller pieces
- Short dogs (double-catcher configuration) for breaking the core
- Second catch (double-catcher configuration) for holding the core

Benefits

- Efficient milling of oversize objects
- Circulating pressure control
- Decreased dog breakage
- Small object-retrieval capability (single-catcher configuration)

Type H Junk Basket

Specifications

Hole Size (in.)	Maximum Fish Diameter (in./mm)	Barrel OD (in./mm)	Shoe Dressed OD (in./mm)	Barrel Connection (in.)	Top Sub Connection	Tool Assembly Number
3-7/8 to 4-1/4	2-23/32 69.06	3-5/8 92.08	3-3/4 95.25	3-1/2, 9.2 lb HYD FJWP	2-3/8 API IF	473-118
4-5/8 to 4-7/8	3-1/16 77.79	4-1/4 107.95	4-1/2 114.30	4, 11.6 lb HYD FJWP	2-7/8 API IF.	473-117
4-7/8 to 5-1/4	3-3/8 85.73	4-1/2 114.30	4-3/4 120.65	4-1/2, 16.6 lb HYD FJWP	2-7/8 API IF.	473-123
5-1/4 to 5-5/8	3-9/16 90.49	4-3/4 120.65	5 127.00	4-1/2, 16.6 lb HYD FJWP	2-7/8 API IF.	473-122
6 to 6-1/4	4 101.60	5-5/8 142.88	5-3/4 146.05	5-1/2, 17 lb HYD FJWP	3-1/2 API IF	473-120
6-1/4 to 6-3/4	4 101.60	5-7/8 149.23	6 152.40	5-1/2, 17 lb HYD FJWP	3-1/2 API IF	473-125
6-1/4 to 6-3/4	4-5/8 117.48	5-7/8 149.23	6 152.40	5-1/2 X-LINE	3-1/2 API IF	473-126
6-7/8 to 7-1/4	4-5/8 117.48	6-1/4 158.75	6-1/2 165.10	5-1/2, 17 lb HYD FJWP	3-1/2 API IF.	473-130
7-3/8 to 7-7/8	5 127.00	7 177.80	7-1/4 184.15	7, 26 lb HYD FJWP	4 API IF	473-135
7-5/8 to 8	5-1/2 139.7	7-3/8 187.33	7-1/2 190.50	7 X-LINE	4 API IF	473-138
7-7/8 to 8-3/4	5-5/8 142.88	7-1/2 190.50	7-5/8 193.68	7 X-LINE	4 API IF	473-140
8-3/4 to 9-1/2	6-1/8 155.58	8-1/4 209.55	8-1/2 215.90	8-1/8, 39.5 lb HYD FJWP	4-1/2 API IF	473-149
8-3/4 to 9-1/2	6-1/4 158.75	8-3/8 212.73	8-5/8 219.08	7-5/8 X-LINE	4-1/2 API IF	473-151
9-1/2 to 10-1/2	7-1/4 184.15	9-1/8 231.78	9-3/8 238.13	8-5/8, 36 lb HYD FJWP	4-1/2 API IF	473-162
10-3/4 to 11-7/8	8-1/8 206.38	10-1/2 266.70	10-3/4 273.05	9-5/8, 43.5 lb HYD FJWP	6-5/8 Reg.	473-163
12 to 15	9 228.60	11-1/4 285.75	11-3/4 298.45	7-5/8 X-LINE	4-1/2 API IF	473-165
15 to 17-3/4	12 304.80	13-3/4 349.25	14-1/2 368.30	13-17/64 8 RF	6-5/8 Reg.	473-142
16-1/2 to 19-1/2	12-1/16 319.09	14-1/2 368.30	16 406.40	13-7/8 8 RF	6-5/8 API Reg.	473-152

Type H Reverse-Circulation Junk Basket



The Weatherford type H reverse-circulation junk basket facilitates retrieval of all types of junk and debris that has accumulated in the bottom of the hole, including debris left behind by other junk baskets. Reverse circulation forces fluid outward, against the side of the hole, washing down the wall and moving the debris to the center of the hole to ensure entry into the junk catcher. The tungsten carbide-dressed shoe mills the junk and debris to easily recoverable sizes.

Weatherford's type H reverse-circulation junk basket is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Retrieval of bottom-hole junk and debris

Features

- Double-wall barrel assembly for producing reverse circulation
- Bearing for free rotation of barrel and shoe around the catcher
- Manganese bronze flipper dogs, closely fitted for improved junk collection and held in place with tungsten carbide-dressed shoe for milling junk and debris to recoverable sizes
- Lifting bail for easier handling and for storage of valve drop ball

Benefits

- Manganese bronze flipper dogs are tough and strong
- Close-fitting flipper dogs hold similar pieces of junk
- Free rotation of barrel and shoe around the catcher reduces dog breakage during milling
- Broken flipper dogs are easily replaced in the field
- Lifting bail facilitates handling

Specifications

Size (in.)	Casing Weight (lb)	Complete Assembly Number	Bushing Part Number	Key Part Number	Overall Length (ft/m)	Bushing ID (in./mm)	Bushing OD (in./mm)	Standard Thread Connections (in.)
8-1/8	32.0	63970-001	63971-001	63972 (2)	88.0 26.8	6.13 155.6	8.13 206.4	8-1/8 FJWP
	35.5	63970-002	63971-002					
	39.5	63970-003	63971-003					

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Venturi Jet Junk Basket



The Weatherford® Venturi jet junk basket (VJJB) is used to retrieve many types of loose junk and debris from a wellbore.

Depending on tool size, the junk basket itself consists of an ejector pump head, jets, a flushing nozzle, and a valve seat. The valve seat also incorporates an upper cage, useful for applications with a high hole angle.

When the valve is activated and fluid is pumped through the jets, the constellation acts as an ejector pump, sucking fluid from the inside of the barrel. Fluid from below replenishes the voided barrel, and any junk in the new fluid is trapped above the finger catchers.

Weatherford's Venturi jet junk basket is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Cleanout operations of short or long duration
- Cleanout operations involving high hole angles
- Recovery of loose junk and debris from a wellbore

Features, Advantages and Benefits

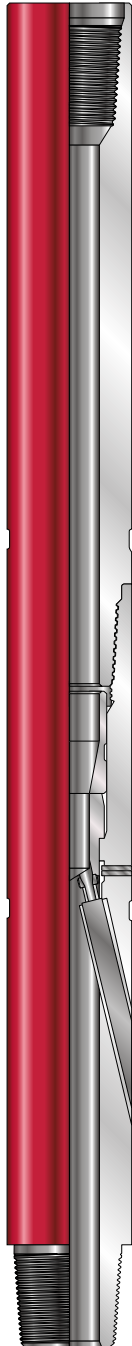
- The valve seat with upper cage keeps the drop ball in place, making the Venturi jet junk basket effective in high-angle hole applications.
- The debris chamber can be lengthened as required for high-volume debris removal, decreasing the number of trips required for long sections of hole cleanout.
- Washpipe extensions are used for the debris chamber, saving equipment costs.
- The true internal vacuum of the barrel creates a reverse circulating effect, minimizing the number of trips required for debris recovery.
- Nozzles are easily changed to compensate pump output for pressure drop at the tool. The performance optimization that this feature enables increases the chances for a successful recovery with fewer trips.

Venturi Jet Junk Basket

Specifications

Complete assembly part number	00116318	00116316	00116317
Body OD (in.)	3-5/8	5-3/4	7-7/8
Maximum tensile yield strength (lb)	108,000	269,000	346,000
Maximum recommended operating torque (ft-lb)	950	4,000	7,000
Top connection	2 3/8-in. Reg. P	3 1/2-in. Reg. P	5 1/2-in. Reg. P
Yield torque (ft-lb)	6,700	16,600	64,600
Makeup torque (ft-lb)	3,350	8,300	32,300
Middle connection	2 3/8-in. IF	4-in. API IF	6 5/8-in. Reg.
Yield torque (ft-lb)	6,600	31,200	61,500
Makeup torque (ft-lb)	3,300	15,600	30,750
Bottom connection	3 1/2-in. 9.2-lb/ft FJWP P	5 3/4-in. 22.5-lb/ft FJWP P	7 5/8-in. 29.7-lb/ft FJWP P
Yield torque (ft-lb)	1,400	6,000	10,500
Makeup torque (ft-lb)	700	3,000	5,250

Venturi Jet System



The Weatherford Venturi jet system (VJS) is used to retrieve many types of loose junk, sand, and debris from a well bore.

Depending on tool size, the system itself consists of an ejector pump head, jets, a flushing nozzle, and a valve seat. The valve seat also incorporates an upper cage, useful for applications with a high hole angle.

When the valve seat is activated and fluid is pumped through the jets, the constellation acts as an ejector pump, sucking fluid from the inside of the barrel. Fluid from below replenishes the voided barrel, and any junk in the new fluid is trapped above the finger catchers.

Applications

- Cleanout operations of short or long duration
- Cleanout operations involving high hole angles

Features

- Valve seat with upper cage for high hole-angle applications
- Debris chamber can be lengthened as required for high-volume debris removal
- Washpipe, drill pipe, or tubing can be used for debris chamber
- Can be run with mud motor
- Hard bottom and coring are not required
- Nozzles are easily changed to compensate pump output for pressure drop at tool
- True internal vacuum of barrel creates reverse circulating effect
- Uses conventional finger catchers, flapper valves, or mouse traps
- Designed with rotary tool joint connections

Benefits

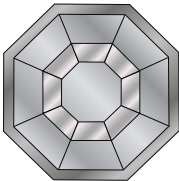
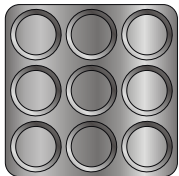
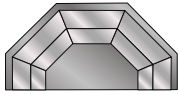
- Can be placed in existing work string to save time
- Can recover loose junk in soft formation conditions
- Improved vacuum effect enables recovery of larger debris
- Uses conventional washpipe rotary shoes and extensions to save costs

Venturi Jet System

Specifications

Complete assembly part number	126128	115795	176702	177199
Body OD (in.)	3-5/8	4-3/4	6-1/4	7-3/4
Maximum tensile yield strength (lb)	278,000	620,000	843,000	1,299,000
Maximum recommended operating torque (ft-lb)	2,000	7,500	16,000	41,000
Top connection	2 3/8-in. IF B	3 1/2-in. IF B	4 1/2-in. IF B	6 5/8-in. Reg. B
Yield torque (ft-lb)	10,000	17,500	40,000	97,900
Makeup torque (ft-lb)	5,000	8,750	20,000	48,950
Middle connection	2 3/8-in. IF	3 1/2-in. IF	4 1/2-in. IF	6 5/8-in. Reg.
Yield torque (ft-lb)	6,600	17,500	34,000	61,200
Makeup torque (ft-lb)	3,300	8,750	17,000	30,600
Bottom connection	2 3/8-in. IF P	3 1/2-in. IF P	4 1/2-in. IF P	6 5/8-in. Reg. P
Yield torque (ft-lb)	6,600	19,600	34,000	61,200
Makeup torque (ft-lb)	3,300	9,800	17,000	30,600

CustomCut™ Inserts



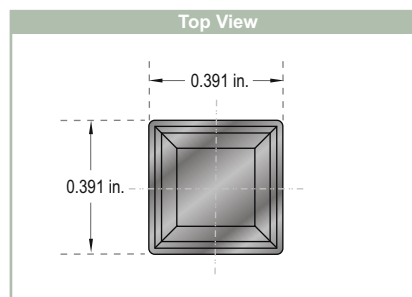
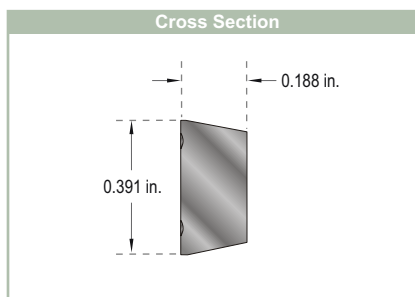
Weatherford's *CustomCut* milling- or cutting-grade inserts are available in various configurations and geometries. Advanced mill engineering and Weatherford certified welders ensure a consistent and durable cutting structure. The proprietary negative rake and chip-breaker design of these inserts provides smaller, thinner, and lighter cuttings that are quickly and easily circulated and flowed to the surface for better hole cleaning efficiency and faster penetration rates.

CustomCut inserts are a product of Weatherford's MillSmartSM technology, an engineered approach to performance milling that incorporates materials and designs based on a complete system process.

Features, Advantages and Benefits

- Chip-breaker indentation on the insert face encourages bending of the cutting chips, producing smaller chips that are more easily circulated out and enhancing hole cleaning and milling efficiency.
- Negative rake angle of the insert face to the cutting surface reduces chatter, providing smoother cutting action and increasing insert life and efficiency.
- Milling-grade carbide maximizes performance and durability for the interrupted cutting of steel. Extremely hard, cutting-grade carbide speeds the cutting of steel with lighter loads.
- Nickel or copper coatings help to bond and prevent oxidization for longer life and enhanced cutting and milling efficiency.
- Spacer feet allow quick tipping of inserts for improved bonding to base material.

102741-607-826 *CustomCut* 100C



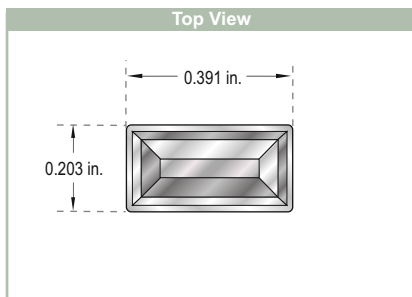
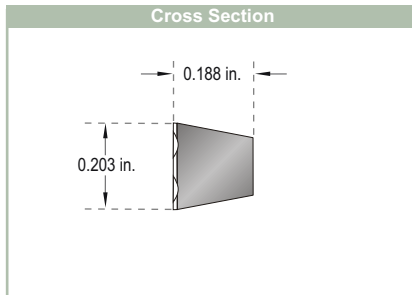
Description

- Insert: square, 0.391 x 0.391 in. (9.931 x 9.931 mm), 0.188 in. (4.775 mm) thick
- Chip breaker: square
- Cutting-grade carbide (N50)

Applications

- Junk mills, string mills, rotary shoes, section mills, and casing exit mills for common carbon-alloy steels
- All sizes conventional starter mills and window mills
- All sizes ShallowAngle QuickCutTM secondary and steering mills All sizes QuickCut flex mills 9 5/8-in. StarBurstTM multilateral system (MLS) window mill

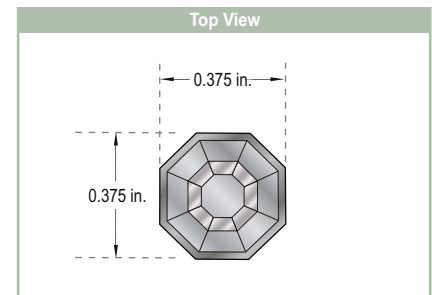
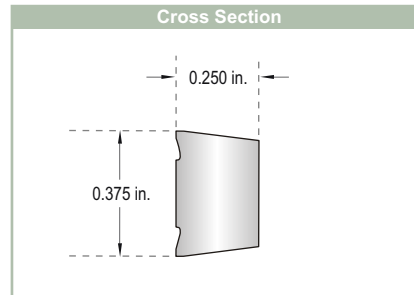
CustomCut™ Inserts

100696-14268
CustomCut 101C

Description

- Insert: rectangle, 0.391 x 0.203 in. (9.931 x 5.156 mm), 0.188 in. (4.775 mm) thick
- Chip breaker: rectangle
- Cutting-grade carbide (N50)

Applications

- Tight-tolerance dressing of shoe IDs, section mill blades
- Gauge protection next to body of various string, tapered, and watermelon mills for common carbon-alloy steels

277642-R6033264 CustomCut 200M

Description

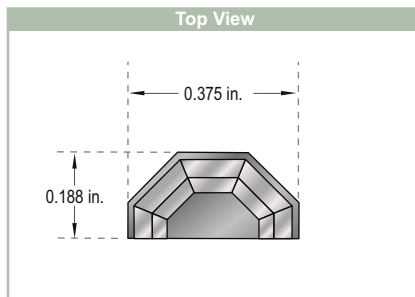
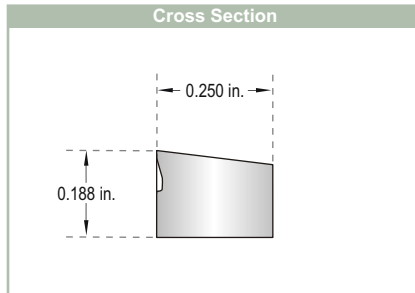
- Insert: octagon, 0.375 in. (9.525 mm), 0.250 in. (6.350 mm) thick
- Chip breaker: octagon
- No feet
- Milling-grade WMS-218
- C-1 classification: higher percentage of cobalt, with no nickel coating, gives insert darker appearance than coated inserts or standard N-51 inserts

Applications

- Multi-blade convex and concave composite cast-iron bridge plugs, mills, step mills, cement mills
- General milling of common alloy steels
- Thru-tubing underreamer blades for tubing and casing 4-1/2 in. and larger
- C-1 classification: cutting stainless or chrome materials
- C-5 classification: applications that require greater heat tolerance than conventional inserts when applying or dressing
- All sizes QuickCut™ lead mills (both pilot and OD blades) and flex mills
- All sizes ShallowAngle QuickCut lead mills (both pilot and OD blades), secondary, and steering mills
- All sizes starter mills and conventional window mills
- 5 1/2-in. StarBurst™ tri-blade starter mill
- 5 1/2-in. StarBurst MLS window mill

CustomCut™ Inserts

279717-R6033263 CustomCut 201M



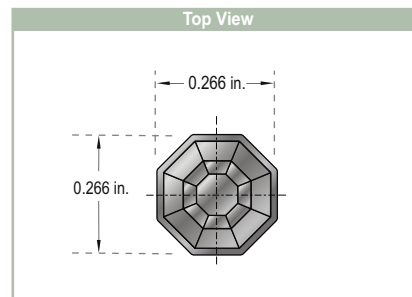
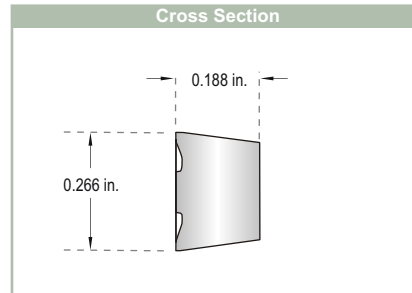
Description

- Insert: half-octagon, 0.375 x 0.188 in. (9.525 x 4.775 mm), 0.250 in. (6.350 mm) thick
- Chip breaker: half-octagon
- Milling-grade WMS-218

Applications

- Tight-tolerance dressing, as needed, on mill and thru-tubing underreaming applications, as described for the CustomCut 200M insert

728199-R6033260 CustomCut 202M



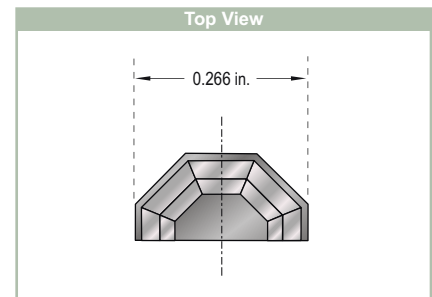
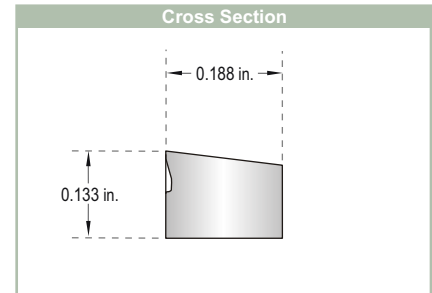
Description

- Insert: octagon, 0.266 in. (6.756 mm), 0.188 in. (4.775 mm) thick
- Chip breaker: octagon
- Milling-grade WMS-218

Applications

- Multi-blade convex and concave composite cast-iron bridge plugs, mills, step mills
- General milling of common alloy steels
- Thru-tubing underreamer blades for tubing 4 in. and larger

728201-R6033267 CustomCut 203M



Description

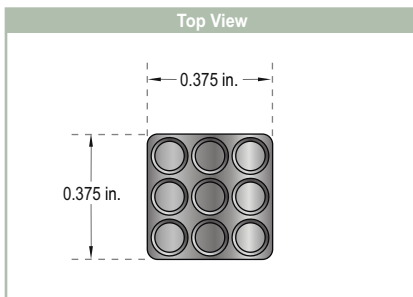
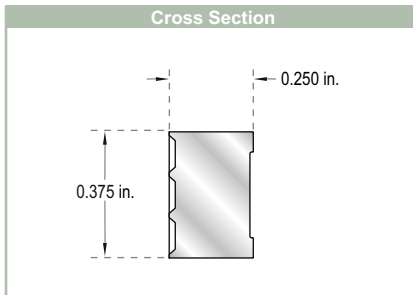
- Insert: half-octagon, 0.266 x 0.133 in. (6.756 x 3.378 mm), 0.188 in. (4.775 mm) thick
- Chip breaker: half-octagon
- Milling-grade WMS-218

Applications

- Tight-tolerance dressing, as needed, on mill and thru-tubing underreaming applications, as described for the CustomCut 200M insert

CustomCut™ Inserts

103298-62817 CustomCut 300M



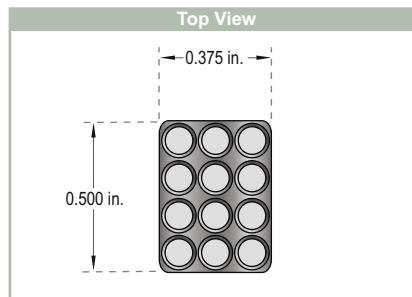
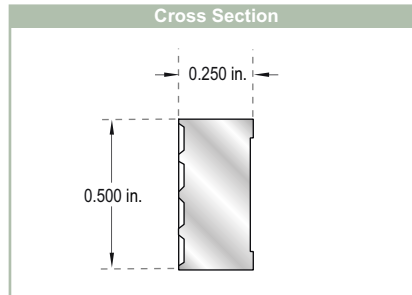
Description

- Insert: square, 0.375 x 0.375 in. (9.525 x 9.525 mm), 0.250 in. (6.350 mm) thick
- Chip breaker: dimple round
- Spacer feet
- Milling-grade WMS-218

Applications

- Pilot milling, section milling, or milling that requires long insert life versus cutting speed for common alloy steels

103306-62971 CustomCut 301M



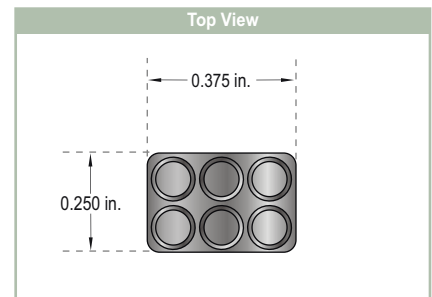
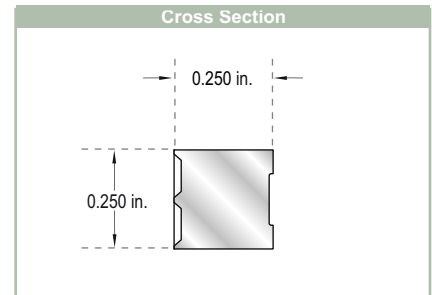
Description

- Insert: rectangle, 0.375 x 0.500 in. (9.525 x 12.700 mm), 0.250 in. (6.350 mm) thick
- Chip breaker: dimple round
- Spacer feet
- Milling-grade WMS-218

Applications

- Pilot milling, section milling, or milling that requires long insert life versus cutting speed for common alloy steels
- 7-in. StarBurst™ MLS window mill

103425-63973 CustomCut 302M



Description

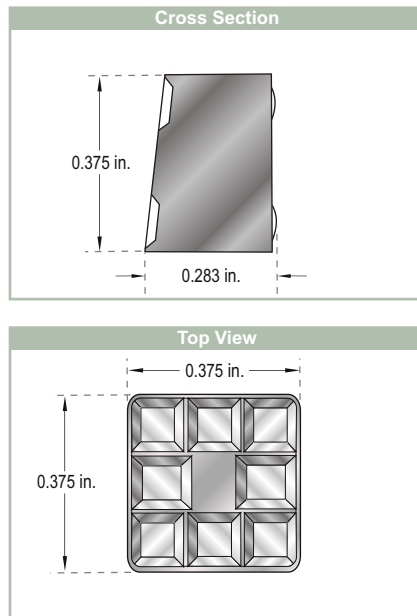
- Insert: rectangle, 0.375 x 0.250 in. (9.525 x 6.350 mm), 0.250 in. (6.350 mm) thick
- Chip breaker: dimple round
- Spacer feet
- Milling-grade WMS-218

Applications

- Pilot milling, section milling, or milling that requires long insert life versus cutting speed for common alloy steels

CustomCut™ Inserts

HF-20001 CustomCut 303M



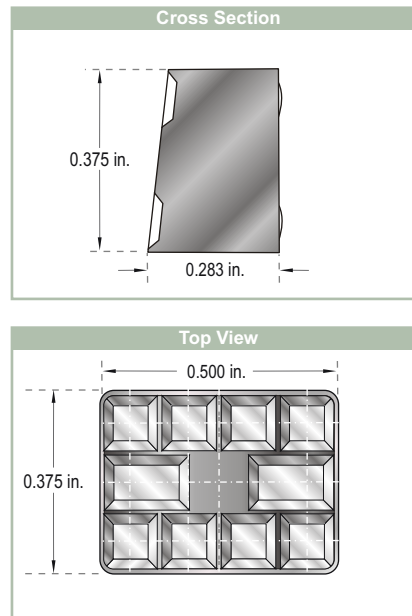
Description

- Insert: square, 0.375 x 0.375 in. (9.525 x 9.525 mm)
- Chip breaker: dimple round
- Spacer feet
- Negative rake level
- Milling-grade WMS-218

Applications

- Pilot milling, section milling, or milling that requires long insert life versus cutting speed for common alloy steels

HF-20002 CustomCut 304M



Description

- Insert: square, rectangle, 0.500 x 0.375 in. (12.700 x 9.525 mm)
- Chip breaker: dimple square
- Spacer feet
- Negative rake level
- Milling-grade WMS-218

Applications

- Pilot milling, section milling, or milling that requires long insert life versus cutting speed for common alloy steels

Flat-Bottom (Cone Buster) Mills

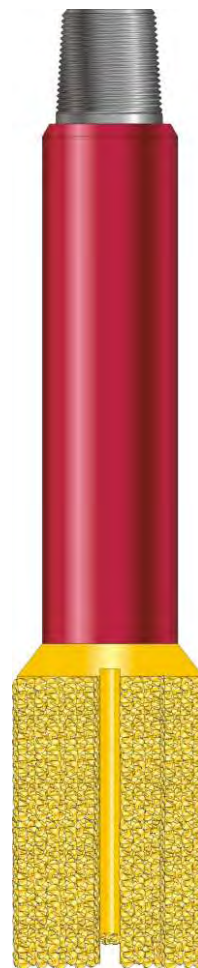
Weatherford's cone-buster junk mills are designed for use in milling and spudding operations to clean up loose junk in wellbores. The spudding action pounds loose junk onto the bottom of the wellbore, breaking the junk into smaller pieces and positioning it for more effective milling. Cone-buster junk mills can be ordered for any OD to meet job-specific requirements.

Features, Advantages and Benefits

- Large circulation ports and watercourses enable improved fluid circulation and cutting removal, saving time.
- Slightly concave mill-head bottom restricts fish to the center of the mill head for better access control.
- Mills can be dressed smooth OD for cased-hole wellbores and rough OD for openhole wellbores for greater versatility.
- Milling solutions cover the full range of casing and tubing sizes and weights.

Specifications

Standard Junk Mill OD (in./mm)	Standard Top Pin Connection (API Reg.) (in.)	Standard Fishneck Length (in./mm)	Standard Fishneck Diameter (in./mm)	Approximate Weight (lb/kg)
3-1/2 to 4-1/2 88.9 to 114.3	2-3/8	12 305	3-1/8 79.37	45 20.4
4-1/2 to 5-1/2 114.3 to 139.7	2-7/8		3-3/4 95.25	62 28.1
5-1/2 to 6 139.7 to 152.4	3-1/2		4-1/4 107.95	95 43.1
5-3/4 to 7-1/2 146.1 to 190.5			4-3/4 120.65	105 47.6
7-1/2 to 9 190.5 to 228.6	4-1/2		5-3/4 146.05	180 81.7
9-1/2 to 12-1/4 241.3 to 311.2	6-5/8		7-3/4 196.85	350 158.8
13 to 15 330.2 to 381.0	6-5/8 or 7-5/8		7-3/4 196.85	500 226.8
17 to 17-1/2 431.8 to 444.5			or 9-1/2	625 283.5
18-1/2 to 26 469.9 to 660.4			241.30	1,200 544.3



Bladed Junk Mills



Weatherford offers a full line of standardized bladed junk mills, designed to mill any type of junk or debris from the wellbore. These “workhorses” of downhole milling operations can be dressed either with CustomCut™ tungsten carbide inserts, for stationary fish or junk, or with crushed tungsten carbide, for loose fish or junk. Large circulation ports and watercourses improve fluids circulation for cooling and facilitate cuttings removal. Bladed junk mills can be ordered for any length and OD to meet the specific requirements of the job.

Weatherford's bladed junk mills are products of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

Milling almost anything in the wellbore, including, but not limited to: bit cones, bits, cement, packers, squeeze tools, perforating guns, drillpipe, tool joints, reamers, and reamer blades.

Features, Advantages and Benefits

- Rugged, durable construction extends milling time per trip for maximized milling efficiency.
- Crushed tungsten carbide dressing, used for milling loose fish or junk, extends the life of the mill.
- CustomCut tungsten carbide inserts, used for milling stationary fish or junk, improve penetration rates and milling footage.
- Extra-long mill heads minimize risk of casing damage.
- Large circulation ports and watercourses improve cooling during milling operations and provide better fluids circulation and cuttings removal for optimal milling efficiency.
- Mill-head design customization capability provides milling solutions for the full range of open hole, casing, and tubing sizes and weights.
- Smooth OD reduces risk of casing damage in cased-hole wellbores.

Bladed Junk Mills

Specifications

Standard Junk Mill OD (in./mm)	Standard Top Pin Connection (API Reg.) (in.)	Standard Fishing Neck		Approximate Weight (lb/kg)
		Length (in./mm)	OD (in./mm)	
3-1/2 to 4-1/2 88.9 to 114.3	2-3/8	12 305	3-1/8 79.4	45 21
4-1/2 to 5-1/2 114.3 to 139.7	2-7/8	12 305	3-3/4 95.3	62 28
5-1/2 to 6 139.7 to 152.4	3-1/2	12 305	4-1/4 108.0	95 43
5-3/4 to 7-1/2 146.1 to 190.5	3-1/2	12 305	4-3/4 120.7	105 48
7-1/2 to 9 190.5 to 228.6	4-1/2	12 305	5-3/4 146.1	180 82
9-1/2 to 12-1/4 241.3 to 311.2	6-5/8	12 305	7-3/4 196.9	350 159
13 to 15 330.2 to 381.0	6-5/8 or 7-5/8	12 305	7-3/4 or 9-1/2 241.3 or 196.9	500 227
17 to 17-1/2 431.8 to 444.5	6-5/8 or 7-5/8	12 305	7-3/4 or 9-1/2 241.3 or 196.9	625 283
18-1/2 to 26 469.9 to 660.4	6-5/8 or 7-5/8	12 305	7-3/4 or 9-1/2 241.3 or 196.9	1,200 544

Options

- Concave, convex, and flat-bottom designs available
- Dressed with CustomCut™ tungsten carbide inserts for stationary fish or junk
- Dressed with crushed tungsten carbide for loose fish or junk
- Various lengths of fishing necks, stabilizers, and combination stabilizer-fishing necks available
- Smooth OD for cased-hole wellbores
- Rough OD for openhole wellbores
- Can be ordered for any length and OD to meet job-specific requirements

Type P Junk Mill



Weatherford's type P junk mill is used for milling junk and debris from the wellbore; but its durability also gives it the longer life needed for milling cemented tubulars. An offset center prevents coring of the mill during milling operations. The special deep-V design maximizes fluids circulation to provide better cooling and more efficient removal of cuttings. The type P junk mill can be ordered in any length and OD to meet job-specific requirements. The type P junk mill is usually dressed with crushed tungsten carbide but under special applications is dressed with CustomCut™ inserts.

Weatherford's type P junk mill is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Milling junk, debris, and cemented tubulars

Features, Advantages and Benefits

- Offset center prevents coring of the mill during milling operations, extending mill life and saving equipment costs.
- Deep-V design provides a larger circulating total flow area for better cooling of the carbide cutting structure and more efficient cuttings removal.
- The mill can be dressed for open or cased hole to suit job-specific requirements.

Specifications

Mill			Standard Fishing Neck	
Body OD (in./mm)	Standard Top Pin Connection	Approximate Shipping Weight (lb/kg)	Length (in./mm)	OD (in./mm)
3-1/2 to 4-1/2 88.9 to 114.3	2 3/8-in. Reg	45 20	12 304.8	3-1/8 79.4
4-1/2 to 5-1/2 114.3 to 139.7	2 7/8-in. Reg	62 28	12 304.8	3-3/4 95.3
5-1/2 to 6 139.7 to 152.4	3 1/2-in. Reg	95 43	12 304.8	4-1/4 108.0
5-3/4 to 7-1/2 146.1 to 190.5	3 1/2-in. Reg	105 48	12 304.8	4-3/4 120.7
7-1/2 to 9 190.5 to 228.6	4 1/2-in. Reg	180 82	12 304.8	5-3/4 146.1
9-1/2 to 12-1/4 241.3 to 311.2	6 5/8-in. Reg	350 159	12 304.8	7-3/4 196.9
13 to 15 330.2 to 381.0	6 5/8- or 7 5/8-in. Reg	500 227	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9
17 to 17-1/2 431.8 to 444.5	6 5/8- or 7 5/8-in. Reg	625 284	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9
18-1/2 to 26 469.9 to 660.4	6 5/8- or 7 5/8-in. Reg	1,200 544	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9

CustomCut™ Pilot Mill (Diamond Point)

Weatherford's *CustomCut* diamond-point pilot mill can be used to mill a full range of tubular products. The mill consists of a leading stabilizer (the pilot), which is sized for the ID of the tubular, and a major diameter section, sized at least 1/4 in. larger than the coupling OD. The *CustomCut* diamond-point mill can be dressed with crushed carbide or with one of the family of *CustomCut* inserts, as appropriate for the application.

Weatherford's diamond point *CustomCut* pilot mill is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- The *CustomCut* diamond-point pilot mill is used for milling tubing, casing, liner hangers, liners, drillpipe, drill collars, wash pipe, or perforated liners.
- *CustomCut* inserts that are specifically tailored to the operation and to the capabilities of the surface equipment. For surface equipment or fluids with limited capabilities, *CustomCut* 100 series inserts produce small, lightweight cuttings. For premium fluids and high-volume surface equipment, *CustomCut* 200 and 300 series inserts maximize milling rates and the life of the pilot mill.

Features, Advantages and Benefits

- Full OD ensures that collars are milled in the same operation, eliminating creation of junk in the wellbore and extending the life of the pilot mill.
- Optimized alignment of *CustomCut* insert to proper cutting angle produces smaller cuttings for better wellbore cleaning and longer life of the mill.
- Longer blades extend downhole cutting time and the life of the mill.
- Insert selection capability optimizes the mill design to the composition of the tubular being milled and the capabilities of surface facilities, resulting in higher rates of penetration.

Specifications

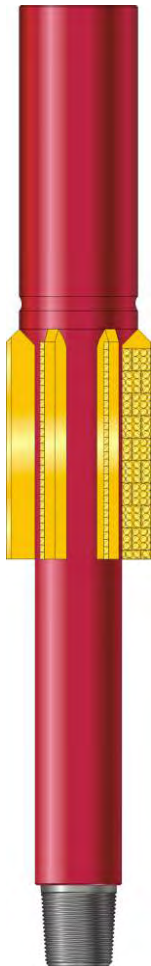
Casing Size (in.)	Top Pin Connection	Mill Blade OD	
		(in.)	(mm)
4-1/2	3 1/2-in. Reg.	5.250	133.350
5		5.813	147.650
5-1/2		6.300	160.020
6		6.875	174.625
6-5/8	4 1/2-in. Reg.	7.640	194.056
7		7.916	201.066
7-5/8		8.750	222.250
8-5/8		9.875	250.825
9-5/8	6 5/8-in. Reg.	10.875	276.225
10-3/4		12.000	304.800
11-3/4		13.000	330.200
13-3/8		14.625	371.475

Options

Applications	Inserts
Surface equipment or fluids with limited capabilities	100C
	101C
	200M
High-volume surface equipment and premium fluids	201M
	202M
	203M
	300M
	301M
	302M
	303M
	304M



CustomCut™ Pilot Mill (Lower-Connection Type)



Weatherford's *CustomCut* lower-connection type pilot mill can be used to mill a full range of tubular products. This versatile tool is run above a taper mill; but an optional stabilizer can also be run with the taper mill as the pilot, which is sized for the ID of the tubular. In addition, drill collars can be run below the mill for milling weight in shallow-well applications. The major diameter section of the lower-connection type pilot mill is sized at least 1/4 in. larger than the coupling OD, eliminating creation of junk in the wellbore and extending the life of the pilot mill. The *CustomCut* lower-connection type pilot mill is dressed with one of the family of *CustomCut* inserts, as appropriate for the application.

Weatherford's lower-connection type *CustomCut* pilot mill is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- The *CustomCut* lower-connection type pilot mill is used for milling tubing, casing, liner hangers, liners, drillpipe, drill collars, wash pipe, or perforated liners.
- *CustomCut* inserts are specifically tailored to the operation and to the capabilities of the surface equipment. For surface equipment or fluids with limited capabilities, *CustomCut* 100 series inserts produce small, lightweight cuttings. For premium fluids and high-volume surface equipment, *CustomCut* 200 and 300 series inserts maximize milling rates and the life of the pilot mill.

Features, Advantages and Benefits

- Full OD ensures that collars are milled in the same operation, eliminating creation of junk in the wellbore and extending the life of the pilot mill.
- Optimized alignment of *CustomCut* insert to proper cutting angle produces smaller cuttings for better wellbore cleaning and longer life of the mill.
- Longer blades extend downhole cutting time and the life of the mill.
- Pin-down design facilitates the optimal, operation-specific bottomhole assembly to increase pilot milling success.
- Insert selection capability optimizes the mill design to the composition of the tubular being milled and the capabilities of surface facilities, resulting in higher rates of penetration.

CustomCut™ Pilot Mill (Lower-Connection Type)

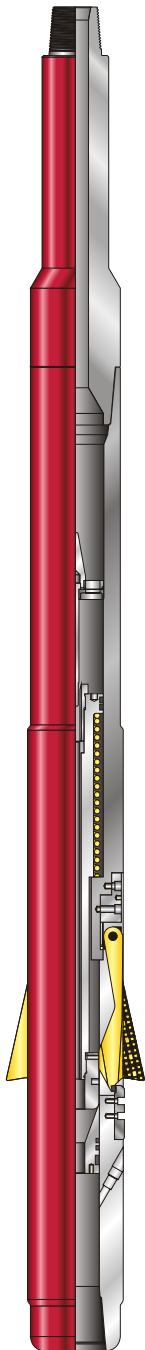
Specifications

Casing Size (in.)	Top Box Connection	Mill Blade OD	
		(in.)	(mm)
4-1/2	3 1/2-in. Reg.	5.250	133.350
5		5.813	147.650
5-1/2		6.300	160.020
6		6.875	174.625
6-5/8	4 1/2-in. Reg.	7.640	194.056
7		7.916	201.066
7-5/8		8.750	222.250
8-5/8		9.875	250.825
9-5/8	6 5/8-in. Reg.	10.875	276.225
10-3/4		12.000	304.800
11-3/4		13.000	330.200
13-3/8		14.625	371.475

Options

Applications	Inserts
Surface equipment or fluids with limited capabilities	100C
	101C
High-volume surface equipment and premium fluids	200M
	201M
	202M
	203M
	300M
	301M
	302M
	303M
	304M

Reverse-Flow Section Mill



Weatherford's reverse-flow section mill is a hydraulically actuated tool used to mill a section in casing or tubing. This section mill is simple in design, easy to operate, and, with Weatherford's MillSmartSM technology, has acquired an outstanding reputation for milling performance. The milling knives are dressed with Weatherford's CustomCutTM tungsten carbide inserts to provide extended footage with maximum penetration rates.

The section mill is run in conjunction with a taper mill, which has an integral carbide nozzle threaded in the bottom end. Combined with the internal pack-off system, this configuration allows positive fluid control to the section mill knives. Positive fluid control creates a continuous flushing and cleaning action on the knives of the section mill and prevents the cuttings from balling around them. Positive fluid control also keeps the cutting structure cool, which helps to prolong the life of the knives and produces smaller, more controllable cuttings.

Applications

- Milling of a section of casing
 - above and below storage formations
 - in perforated zones in oil wells
 - to squeeze cement to plug old wells
 - to permit a sidetracking operation
 - to allow cement-bonding between new, smaller casing and the formation
- Milling of internal casing patches, screens, liners, and liner packers
- Single-string casing cutting operations

Features, Advantages and Benefits

- Positive fluid control keeps the cutting structure cool and creates a continuous flushing and cleaning action on the knives, increasing the life of the equipment and conserving costs.
- Milling knives are dressed with Weatherford's *CustomCut* inserts for longer life and cost savings.
- Flow indicator provides a positive indication of cutout, which eliminates skimming the inside of the pipe and ensures proper operation of the tool.
- Various nozzle sizes can be predetermined, using Weatherford's HydraProTM hydraulics software, to achieve the most productive flow pattern and hole-cleaning capabilities while milling.

Reverse-Flow Section Mill

Specifications

API Casing and Section Mill Correlation

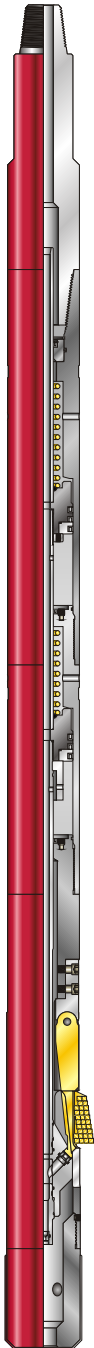
Casing							Section Mill						
Casing Size (in./mm)	Coupling OD (in./mm)	Weight with Coupling (lb/ft)	Casing ID		Drift ID		Body OD (in./mm)	Knife Collapse Diameter		Knife Maximum Open Diameter		Dressed Stop Stabilizer	
			(in.)	(mm)	(in.)	(mm)		(in.)	(mm)	(in.)	(mm)		
7 177.8	7.656 194.5	17.0	6.538	166.06	6.413	162.9	5-1/2 139.7	6-1/4	158.7	9-1/16	230.2	6-3/8	169.9
		20.0	6.456	163.98	6.331	160.8		6-1/8	155.6	8-15/16	227.0	6-1/4	158.7
		23.0	6.366	161.70	6.241	158.5		6	152.4	8-13/16	223.8	6-1/8	155.6
		26.0	6.276	159.41	6.151	156.2		5-7/8	149.2	8-11/16	220.7	6	152.4
		29.0	6.184	157.07	6.059	153.9		5-3/4	146.0	8-9/16	217.5	5-7/8	149.2
		32.0	6.094	154.79	5.969	177.0		5-5/8	142.9	8-7/16	214.3	5-3/4	146.0
		35.0	6.004	152.50	5.879	174.7		6-7/8	174.6	9-11/16	246.0	7	177.8
		38.0	5.920	150.37	5.795	172.6		6-3/4	171.4	9-9/16	242.9	6-7/8	174.6
7-5/8 193.7	8.500 215.9	20.0	7.125	180.97	7.000	177.8	6-1/8 155.6	6-5/8	168.2	9-7/16	239.7	6-3/4	171.4
		24.0	7.025	178.43	6.900	175.2		6-1/2	165.1	9-5/16	236.5	6-5/8	168.2
		26.4	6.969	177.01	6.844	173.8		6-3/8	161.9	9-3/16	233.3	6-1/2	165.1
		29.7	6.875	174.62	6.750	171.4		8-3/4	222.2	12-5/8	320.7	8-7/8	225.4
		33.7	6.765	171.83	6.640	168.6		8-5/8	219.1	12-7/16	315.9	8-3/4	222.2
		39.0	6.625	168.27	6.500	165.1		8-1/2	215.9	12-5/16	312.7	8-5/8	219.1
9-5/8 244.5	10.625 260.7	29.3	9.063	230.20	8.907	226.2	8-1/4 209.5	8-3/4	222.2	12-5/8	320.7	8-7/8	225.4
		32.3	9.001	228.62	8.845	224.7		8-5/8	219.1	12-7/16	315.9	8-3/4	222.2
		36.0	8.921	226.59	8.765	222.6		8-1/2	215.9	12-5/16	312.7	8-5/8	219.1
		40.0	8.835	224.41	8.679	220.4		8-3/8	212.7	12-3/16	309.6	8-1/2	215.9
		43.5	8.755	222.38	8.599	218.4		8-1/4	209.5	12-1/16	306.4	8-3/8	212.7
		47.0	8.681	220.50	8.525	216.5		12-3/8	314.3	17-11/16	449.2	12-1/2	317.5
		53.5	8.535	216.79	8.379	212.8		12-1/4	311.1	17-9/16	446.1	12-3/8	314.3
13-3/8 339.7	14.375 365.1	48.0	12.715	322.96	12.559	319.0	11-1/2 292.0	12-1/8	308.0	17-7/16	442.9	12-1/4	311.1
		54.5	12.615	320.42	12.459	316.4		12	304.8	17-5/16	439.7	12-1/8	308.0
		61.0	12.515	317.88	12.359	313.9							
		68.0	12.415	315.34	12.259	311.4							
		72.0	12.347	313.61	12.191	309.6							

Section Mill Body OD (in./mm)	Casing Sizes (in.)	Overall Length (in./m)	Top Pin Connection*	Approximate Shipping Weight (lb/kg)	Range Required During Cut-Out Using 10-PPG Fluid (GPM/LPM)	Range Required During Milling Using 10-PPG Fluid (GPM/LPM)
5-1/2 139.7	6-5/8 and 7	74 1.88	3 1/2-in. Reg.	450 204.1	100 to 135 378.5 to 511.0	200 to 350 757.1 to 1,324.9
6-1/8 155.6	7-5/8		4 1/2-in. Reg.	568 257.6	130 to 150 492.1 to 567.8	500 to 700 1,892.7 to 2,649.8
8-1/4 209.5	9-5/8	87 2.21	6 5/8-in. Reg.	1,050 476.0		
11-1/2 292.0	13-3/8	90 2.29	7 5/8-in. Reg.	1,725 782.4	600 to 700 2,271.2 to 2,649.8	1,000 to 1,100 3,785.4 to 4,164.0

API regular pin connections are standard; other connections are available on request.

When ordering or requesting quotations on section mills, specify tool OD required, size and weight of casing to be milled, and top pin connection.

A-1 Section Mill



Weatherford's A-1 section mill is an extremely reliable hydraulically activated tool for milling a section of casing or tubing. The mill is simple in design, is easy to operate, and has an outstanding reputation for milling performance. Milling knives are dressed with Weatherford's CustomCut™ tungsten carbide inserts to provide extended milling footage with maximum rates of penetration.

The A-1 section mill is available in four different models: single-cylinder, high-flow single-cylinder, dual-cylinder, and high-flow dual-cylinder. The dual-cylinder section mills provide greater hydraulic power to the milling knives for milling depths greater than 10,000 ft (3,048 m). The high-flow section mills keep the cutting structure cool and create a continuous flushing-and-cleaning action on the milling knives.

Weatherford's A-1 section mill is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Milling of a section of casing
 - above and below storage formations
 - in perforated zones
 - for squeezing cement to plug old wells
 - to allow a sidetracking operation
 - to ensure cement-bonding between new, smaller casing and the formation
 - for plug and abandonment
- Cutting a single string of casing

Features, Advantages and Benefits

- Milling knives are dressed with Weatherford's *CustomCut* tungsten carbide inserts for longer life and the resulting cost savings.
- Milling knives are available with single blades, for equipment and fluids with limited capabilities, or with double blades, for premium equipment and fluids.
- Various nozzle sizes can be predetermined, using Weatherford's HydraPro™ hydraulics software, to achieve the most productive flow pattern and hole-cleaning capabilities while milling.
- High-flow mills keep the cutting structure cool and create a continuous flushing-and-cleaning action on the milling knives, increasing the life of the equipment and conserving equipment costs.

A-1 Section Mill

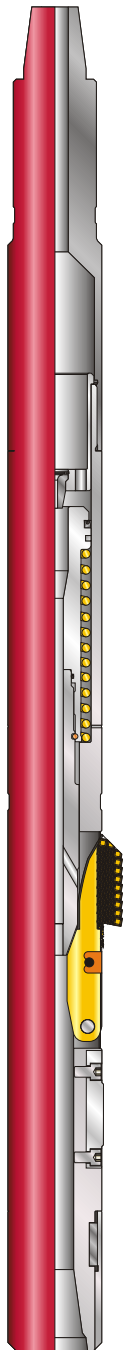
Specifications

Mill				Casing OD (in.)
Body OD (in./mm)	Top Pin Connection	Approximate Shipping Weight (lb/kg)	Assembly Number	
4-1/2 114.30	2 7/8-in. API Reg	215 978	10364	5-1/2
5-1/2 139.70	3 1/2-in. API Reg	529 240	10351	6-5/8 to 7
6-1/4 158.75	3 1/2-in. API Reg	565 256	10841	7-5/8
7-1/4 184.15	4 1/2-in. API Reg	595 270	10558	8-5/8
8 203.20	4 1/2-in. API Reg	911 413	10277	9-5/8
9 228.60	4 1/2-in. API Reg	1,070 485	10811	10-3/4
11-3/4 298.45	6 5/8-in. API Reg	1,405 637	10405	13-3/8

API regular pin connections are standard; other connections are available on request.

When ordering or requesting quotations on A-1 section mills, state depth of section and size and weight of casing to be milled.

Eliminator[®] Section Mill



Weatherford's *Eliminator* section mill is a hydraulically activated tool used to mill sections of casing or tubing. Weatherford designed this mill with an emphasis on simplicity, robustness, ease of maintenance, and ease of operation. Milling knives are dressed with CustomCut™ tungsten carbide inserts to provide extended milling footage with maximum penetration rates.

The most distinguishing feature of the *Eliminator* mill is the knife configuration. Unlike all other section mills, the *Eliminator* mill has knives that pivot from the bottom rather than from the top. This feature provides for a full-sweep diameter greater than the diameter of the casing collar—for the entire knife length. When the knives are activated, the *Eliminator* section mill looks very similar to a pilot mill. The flow indicator incorporated in the design of this mill gives a positive pressure drop at surface when the cutout is made, which prevents “skimming” the ID of the casing.

As with other hydraulic tools with arms, circulation through a restriction in the *Eliminator* mill creates a pressure drop across a tube, which causes the tube to travel downward with the tool body. The downward travel and a tapered surface on the lower end of the tube force the cutting knives outward. The outward knife movement provides the cutting action into the inner surface of the casing. When cutout through the casing wall is achieved, the knives are fully supported into their outermost position, and cutting proceeds in a downward direction on the upper face of the casing, immediately below the cutout point.

Weatherford's *Eliminator* section mill is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Milling of a section of casing
 - above and below storage formations
 - in perforated zones
 - for squeezing cement to plug old wells
 - to permit a sidetracking operation
 - to allow cement-bonding between new, smaller casing and the formation
- Cutting a single string of casing

Features, Advantages and Benefits

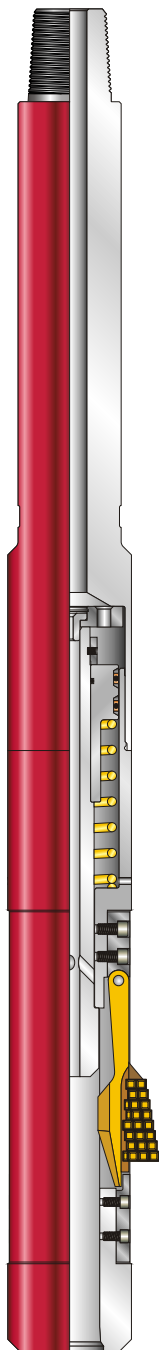
- Reverse-milling knife profile, similar to that of a pilot mill when opened, yields a true OD for the life of the knives, thereby decreasing the number of trips in the hole and providing quicker cutout.
- Integral stabilizer requires fewer connections and is changeable from the rig floor, saving redress time.
- Nozzles in the bodies of the pockets flush cutting and debris away from the milling knives, improving penetration rates and extending the life of the knives.
- Optimized nozzle design allows higher flow rates, using Weatherford's HydraPro™ hydraulics software, to achieve the most productive flow pattern and hole-cleaning capabilities during milling.
- Flow indicator provides positive indication of cutout, preventing “skimming” the ID of the casing.
- Milling knives are dressed with CustomCut™ inserts to provide extended milling footage with maximum penetration rates

Eliminator[®] Section Mill

Specifications

Mill			Casing		Connections	
Body OD (in./mm)	Overall Length (in./m)	Approximate Shipping Weight (lb/kg)	OD (in.)	Weight (lb/ft)	Top Pin	Bottom Box
4-3/8 111.1	59.5 1.5	230 104	5-1/2	14 to 23	2 7/8-in. Reg	

Slimco™ Section Mill



Weatherford's *Slimco* section mill is a hydraulically activated tool designed for section milling operations within small-diameter casing. The mill is simple and robust in design, is easy to operate and maintain and has an outstanding reputation for performance. Milling knives are dressed with Weatherford's CustomCut™ tungsten carbide inserts to provide extended footage with maximum penetration rates.

The *Slimco* section mill has an integral flow indicator, which gives a positive pressure drop at surface when the cutout is made, preventing “skimming” of the casing ID. Nozzles in the body pockets create a continuous flushing-and-cleaning action on the knives of the mill, preventing cuttings from balling around them. This feature also keeps the cutting structure cool, which helps to prolong the life of the knives and produces smaller, more controllable cuttings.

Weatherford's *Slimco* section mill is a product of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Milling of a section of casing
 - above and below storage formations
 - in perforated zones
 - for squeezing cement to plug old wells
 - to permit a sidetracking operation
 - to allow cement-bonding between new, smaller casing and the formation
- Milling internal casing patches, screens, liners, and liner packers
- Cutting a single string of casing

Features, Advantages and Benefits

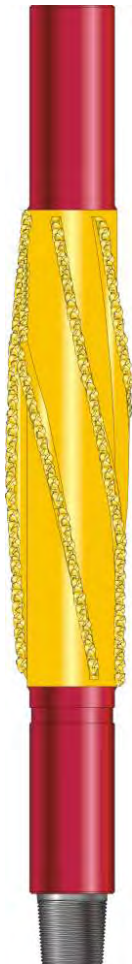
- Positive fluid control keeps the cutting structure cool and creates a continuous flushing-and-cleaning action on the knives, increasing the life of the equipment and thus conserving costs.
- Milling knives are dressed with CustomCut™ inserts for longer life and the resulting cost savings.
- Flow indicator provides a positive indication of cutout, which eliminates “skimming” the inside of the pipe and ensures proper operation of the tool.
- Various nozzle sizes can be predetermined, using Weatherford's HydraPro™ hydraulics software, to achieve the most efficient flow pattern and hole-cleaning capabilities while milling.

Specifications

Mill			Casing OD (in.)
Body OD (in.)	Top Pin Connection	Body OD (mm)	
3-3/4	2 3/8-in. Reg.	95.3	4-1/2
4	2 3/8-in. Reg.	101.6	5
4-1/2	2 7/8-in. Reg.	114.3	5-1/2

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Watermelon/String Mills



Weatherford's watermelon/string mills are excellent for milling out collapsed areas in casing and liners, eliminating key seats and doglegs, and extending whipstock windows. Multiple watermelon/string mills can be run throughout the drillstring.

Slightly spiraled blades, dressed with crushed tungsten carbide, are held to close OD tolerances for maximum opening in the casing or key seat. The blades are tapered top to bottom to allow upward and downward reaming.

Watermelon/string mills are available in standard sizes and can be special ordered to any length and OD to meet the specific requirements of the job.

Weatherford's watermelon/string mills are products of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Milling out collapsed areas in casing and liners
- Eliminating key seats and doglegs in open hole
- Extending whipstock windows

Features, Advantages and Benefits

- Slightly spiraled blades, dressed with crushed tungsten carbide, are held to close OD tolerances for maximum opening in the casing or key seat.
- Top-to-bottom blade tapering allows both upward and downward reaming for increased efficiency.
- Design customization capability, including length, OD size, and smooth- or rough-OD option, provides solutions for the full range of casing and tubing sizes and weights.

Watermelon/String Mills

Specifications

Standard Watermelon/String Mill OD (in./mm)	Standard Connection (API Reg.) (in.)	Standard Fishing Neck		Approximate Weight (lb/kg)
		Length (in./mm)	OD (in.)	
3-1/2 to 4-1/2 88.9 to 114.3	2-3/8	12 304.8	3-1/8 79.4	45 20
4-1/2 to 5-1/2 114.3 to 139.7	2-7/8	12 304.8	3-3/4 95.3	62 28
5-1/2 to 6 139.7 to 152.4	3-1/2	12 304.8	4-1/4 108.0	95 43
5-3/4 to 7-1/2 146.1 to 190.5	3-1/2	12 304.8	4-3/4 120.7	105 48
7-1/2 to 9 190.5 to 228.6	4-1/2	12 304.8	5-3/4 146.1	180 82
9-1/2 to 12-1/4 241.3 to 311.2	6-5/8	12 304.8	7-3/4 196.9	350 159
13 to 15 330.2 to 381.0	6-5/8 or 7-5/8	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9	500 227
17 to 17-1/2 431.8 to 444.5	6-5/8 or 7-5/8	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9	625 283
18-1/2 to 26 469.9 to 660.4	6-5/8 or 7-5/8	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9	1,200 544

Options

- Length and OD can be customized to suit job-specific requirements.
- The mill can be dressed with a smooth or rough OD, as required.
- Crushed tungsten carbide-dressed blades are standard. CustomCut™ inserts can be added to retain the gauge OD of the mill.

Taper Mills



Weatherford's taper mills are used to mill out restrictions in collapsed casing and liner sections, mill through jagged or split guide shoes, enlarge restrictions through retainers and adaptors, and de-burr whipstock windows.

The lower taper section guides the mill into the collapsed section. Then the slightly spiraled blades, dressed with crushed tungsten carbide, mill away the undersized section to full taper mill diameter. The full-bore ID improves fluids circulation for cooling and facilitates cuttings removal.

Taper mills are available in standard sizes or can be special ordered to any length and OD to meet the specific requirements of the job.

Weatherford's taper mills are products of the company's MillSmartSM technology—an engineered approach to milling that encompasses a wide range of proven products, services, and technical resources, developed and refined by the world's largest and most experienced provider of milling and fishing services.

Applications

- Milling out restrictions in collapsed casing and liner sections of any size and weight
- Milling through jagged or split guide shoes
- Enlarging restrictions through retainers and adaptors
- De-burring whipstock windows

Features, Advantages and Benefits

- Crushed tungsten carbide-dressed blades mill the section to full taper mill diameter. Full-bore ID improves better fluids circulation, cooling during milling, cuttings removal, and overall milling efficiency.
- Design customization capability, including length, OD size, and smooth- or rough-OD option, provides solutions for the full range of casing and tubing sizes and weights.

Taper Mills

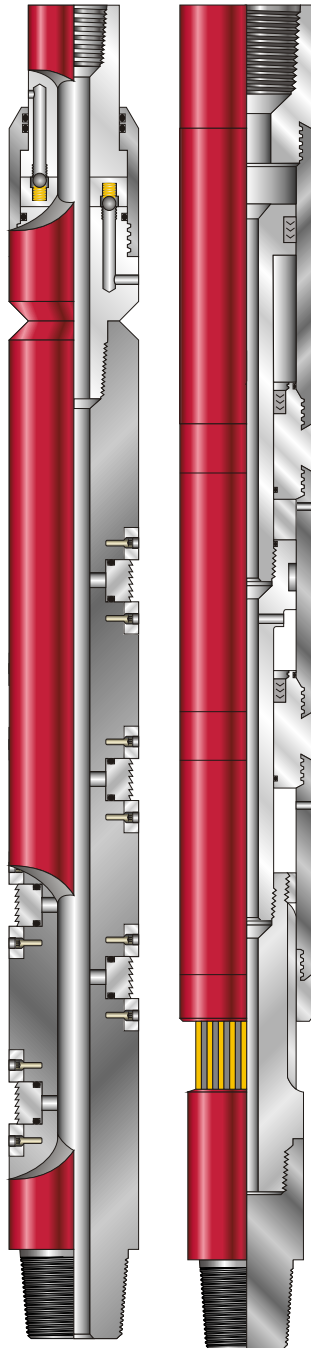
Specifications

Standard Taper Mill OD (in./mm)	Standard Top Pin Connection (API Reg.) (in.)	Standard Fishing Neck		Approximate Weight (lb/kg)
		Length (in./mm)	OD (in./mm)	
3-1/2 to 4-1/2 88.9 to 114.3	2-3/8	12 304.8	3-1/8 79.4	45 20
4-1/2 to 5-1/2 114.3 to 139.7	2-7/8	12 304.8	3-3/4 95.3	62 28
5-1/2 to 6 139.7 to 152.4	3-1/2	12 304.8	4-1/4 108.0	95 43
5-3/4 to 7-1/2 146.1 to 190.5	3-1/2	12 304.8	4-3/4 120.7	105 48
7-1/2 to 9 190.5 to 228.6	4-1/2	12 304.8	5-3/4 146.1	180 82
9-1/2 to 12-1/4 241.3 to 311.2	6-5/8	12 304.8	7-3/4 196.9	350 159
13 to 15 330.2 to 381.0	6-5/8 or 7-5/8	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9	500 227
17 to 17-1/2 431.8 to 444.5	6-5/8 or 7-5/8	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9	625 283
18-1/2 to 26 469.9 to 660.4	6-5/8 or 7-5/8	12 304.8	7-3/4 or 9-1/2 241.3 or 196.9	1,200 544

Options

- Length and OD can be customized to suit job-specific requirements.
- The mill can be dressed with a smooth or rough OD, as required.
- Crushed tungsten carbide-dressed blades are standard. CustomCut™ inserts can be added to retain the gauge OD of the mill.

Hydraulic Pulling Tool



Weatherford's hydraulic pulling tool works with a conventional workover rig to pull liners, packers, or other objects from cased wells without overloading the derrick or the work string. The same pressure that applies the pull also actuates the hydraulic pulling tool slips. The hydraulic pulling tool consists of three basic sections:

- The *control valve section* enables release of the slips and the pull, regardless of the hydrostatic pressure.
- The *anchor section* features piston slips that provide a holding area sufficient for safer pulling without deformation of the casing.
- The *pulling section* exerts its multiplied force over a full 30-in. (762-mm) stroke.

Features, Advantages and Benefits

- COLMONOY[®] coated parts minimize chemical deterioration in commonly encountered environments, providing a longer service life and reducing maintenance costs.
- Thirty-inch (762-mm) stroke overcomes the stretch in long lengths of free pipe frequently encountered above the stuck fish, ensuring that the pulling force reaches the object being pulled.
- The subsurface valve that controls the tool action provides safe, easy running of the tool to and from fishing depth.
- The hydraulic pulling tool will operate using most available on-site rig pumps or a reversing unit, eliminating the need for special power sources.
- The tool can be used with a small work string, with a low-weight-capacity workover rig, or with any mechanical fishing tool, providing optimized operational efficiency.

Specifications

Casing Range (in.)	Pulling Tool OD (in.)	Pulling Ratio*
5	4	35:1
5-1/2 to 6-5/8	4-1/2	47:1
7 to 7-5/8	5-1/2	65:1
8-5/8 to 9-5/8	7	106:1

*Pounds of pull force per 1 PSI of applied pressure

Options

Optional automatic relief valve relieves operating pressure, giving positive surface evidence of a complete tool stroke at fishing depth. This valve allows washovers through the hydraulic pulling tool without the need to drop a ball.

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Locking-Pin Screw-In Sub

The Weatherford locking-pin screw-in sub is designed to replace other types of screw-in subs in the fishing string and is used if the operator anticipates the need for a back-off. Engagement of the locking-pin screw-in sub is mechanical, with normal right-hand rotation. Activation of the locking-pin feature is immediate and requires no special activation procedures. The locking-pin feature will not allow the locking-pin screw-in sub to back off from the fish. The locking pin sub maintains full torque, circulating and tensile strengths for jarring, free-point and back-off operations.

The tool is basically a pin-and-box sub, but the pin end consists of two parts. Application of left-hand torque after the pin end is screwed into a box activates the lock ring, which throws the lower half of the pin out of alignment with the upper half and locks the connection.

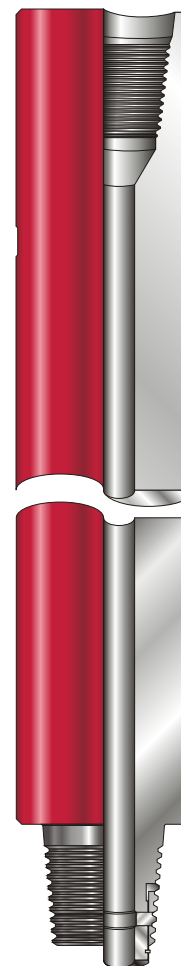
Once a lower back-off is accomplished, the tool can be easily released at the surface using the supplied releasing tool.

Features, Advantages and Benefits

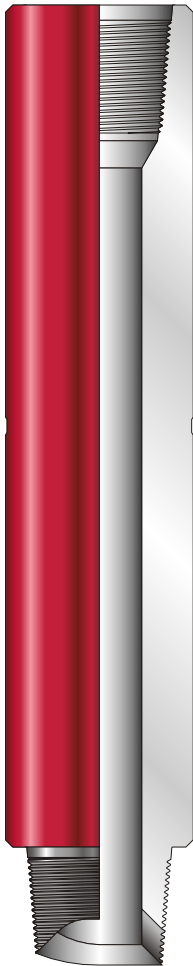
- The sub requires only normal right-hand rotation to engage the fish, no special activation procedures.
- Full torque and circulating capabilities are obtained when screwed into the fish.
- Maximum tensile strength is maintained for jarring, free-point and back-off operations when screwed into the fish.
- The lock ring on the screw-in sub allows left-hand torque to be transmitted through the sub without the risk of backing off at the screw-in point.
- Releasing the tool allows application of left-hand torque without disturbing alignment of the two pin parts and easy release from the recovered fish at surface.

Specifications

Tool		Connection
OD (in.)	Maximum ID (in.)	
3-5/8	1	2-7/8 API Reg
6-1/4	1-1/2	4-1/2 API IF
6-1/2		4-1/2 API XH
7-3/4		6-5/8 API Reg
8		



Screw-In Sub



Weatherford's screw-in sub is used in fishing operations to screw into the box of a backed-off drillstring downhole. Screwing into a fish is the preferred method of engagement because it allows full circulation to the fish and provides an unobstructed ID through which wireline tools can pass. The screw-in sub allows the operator to retain the pre-backoff tensile, torsional, and circulating characteristics for maximum jarring and pipe-working loads.

Features, Advantages and Benefits

- Cut lip, or tang, on the pin end helps the pin end guide itself into the box connection for easy makeup.
- Standard API right-hand box-up and pin-down connections eliminate the need for a crossover sub and allow the screw-in sub to be screwed directly into fish from the work string, providing an unobstructed ID through which wireline tools can pass.
- Simple right-hand rotation screws the string back together.

Specifications

Tool		API Connection*
OD (in./mm)	Maximum ID (in./mm)	
3-3/4 95.250	1-1/4 31.750	2 7/8-in. API Reg.
6-3/8 161.925	3-3/4 95.250	4 1/2-in. API IF
6-1/2 165.100	3-3/4 95.250	4 1/2-in. API IF
7-3/4 196.850	3-1/2 88.900	6 5/8-in. API Reg.
8 203.200	3-1/2 88.900	6 5/8-in. API Reg.

*Other API tool joint connections available on request

Drop Ball-Type Circulation-Control Pump-Out Sub

Weatherford's drop ball-type circulation-control pump-out sub is used primarily to prevent pulling a wet string during plugged-fish recovery operations and as a point of circulation in well control procedures. The simple design of the pump-out sub consists of a drop ball, a sleeve, and a shear pin. If circulation is not possible, a drop ball is pumped down the drillstring until it is seated in the sleeve. With additional work-string pressure, the drop ball will shear the shear pin, allowing the sleeve to shift downward. This action allows three ports to open, through which fluids can circulate.

Applications

- Plugged-fish engagement and recovery operations
- Use as a drain sub
- Circulation control procedures

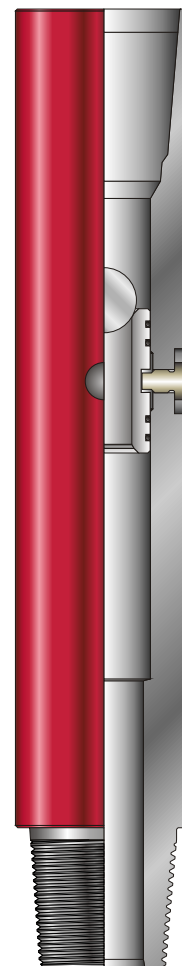
Features, Advantages and Benefits

- Circulation can be restored, when a plugged fish is engaged, to keep the work string from sticking, thereby minimizing nonproductive time.
- The pump-out sub prevents pulling a wet string, saving drilling mud and trip time.
- The ID of the pump-out sub is large enough for wireline tools to pass through in free-point and back-off operations.

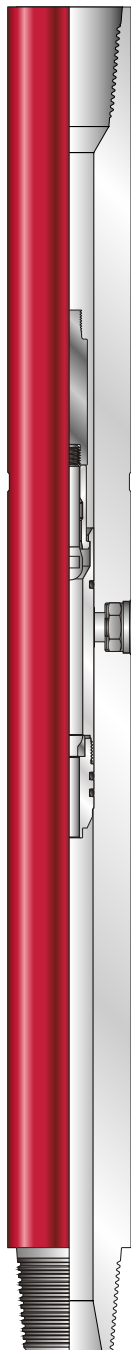
Specifications

Tool OD (in./mm)	Connections	Piston		O-Ring Size	Shear Screw			Drop-Ball Size*	
		Bore (in./mm)	Diameter (in./mm)		Type	Diameter (in./mm)	Shear Value (PSI/bar)	Minimum (in./mm)	Maximum (in./mm)
3-1/8 79.375	2 7/8-in. PAC	5/8 15.875	1-1/2 38.100	218-V90	5/8-in. UNC	0.3300 8.382	1,875 129.277	3/4 19.050	—
	2 7/8-in. PAC-HT	3/4 19.050		218-V90	5/8-in. UNC	0.3300 8.382	1,875 129.277	7/8 22.225	—
3-3/8 85.725	2 3/8-in. HT SLH90	1-1/8 28.575	1-7/8 47.625	223-V90	5/8-in. UNC	0.3300 8.382	1,200 82.737	1-1/4 31.750	1-3/8 34.975
	3 1/2-in. XT 31	1-1/8 28.575	2-1/2 63.500	228-V90	5/8-in. UNC	0.3300 8.382	1,200 82.737	1-1/4 31.750	2 50.800
4-1/8 104.775	2 7/8-in. IF	1-3/8 34.975	2-1/2 63.500	228-V90	5/8-in. UNC	0.4400 11.176	1,200 82.737	1-1/2 38.100	2 50.800
4-1/4 107.950	2 7/8-in. IF	1-1/4 31.750	2-1/8 53.975	225-V90	5/16-in. UNC x 3	0.2443 6.205	1,200 82.737	1-1/2 38.100	1-3/4 44.450
4-3/4 120.165	3 1/2-in. IF	1-1/2 38.100	2-1/2 63.500	228-V90	5/8-in. UNC	0.4400 11.176	1,200 82.737	1-3/4 44.450	2-1/8 53.975
		1-3/4 44.450	2-3/4 69.850	230-V90	3/8-in. UNC x 3	0.2983 7.577	1,100 75.842	1-7/8 47.625	
		1-7/8 47.625	2-1/2 63.500	228-V90	5/8-in. UNC	0.4400 11.176	1,200 82.737	2 50.800	
6-1/2 165.100	4 1/2-in. IF	1-3/4 44.450	3-3/4 95.250	238-V90	7/16-in. UNC x 3	0.3499 8.887	800 55.158	1-7/8 47.625	2-1/8 53.975
		1-7/8 47.625	3-1/2 88.900	236-V90	5/8-in. UNC	0.4370 11.010	600 41.369	2 50.800	3 76.200
		2 50.800						2-1/4 57.150	
		2-3/8 60.325						2-1/2 63.500	
8 203.200	6 5/8-in. Reg.	1-7/8 47.625	3-1/2 88.900	236-V90	5/8-in. UNC	0.4370 11.010	600 41.369	2 50.800	3 76.200
		2-3/8 60.325						2-1/2 63.500	
		1-11/16 68.275						2-3/4 69.850	

*Depends on pin ID



Circulation-Control Joint/Rupture Disk Sub



Weatherford's circulation-control joint/rupture disk sub allows establishment of circulation at a predetermined hydraulic pressure to the work string. The circulation-control joint is most commonly used to prevent pulling a wet string in plugged-fish recovery operations and as a point of circulation if a plugged fish is engaged. With the rupture disk removed, the circulation-control joint is also used as a seating sub for wireline washout tools, as a kick sub, and as a drain sub. If circulation is required below the circulation-control joint after the rupture disk has been ruptured, or if a rupture disk was not run in the hole, the circulation port can be resealed by dropping a restriction plug (which is also wireline retrievable) from surface.

Applications

- Plugged-fish engagement and recovery operations
- As a seating sub in wireline washout operations
- As a drain or kick sub

Features, Advantages and Benefits

- Circulation can be established, if a plugged fish is engaged, to keep the work string from sticking.
- The circulation-control joint prevents pulling a wet string, saving drilling mud and trip time.
- The circulation port can be resealed from surface to allow attempts to circulate below the circulation-control joint.
- The ID of the circulation-control joint is large enough for wireline tools to pass through in free-point and back-off operations.

Specifications

OD (in./mm)	Connection (Box x Pin)
4-1/8 104.800	2 7/8-in. API IF (NC-31)
4-3/4 120.700	3 1/2-in. API IF (NC-38)
5-1/2 139.700	4 1/2-in. API Reg.
5-3/4 146.100	4 1/2-in. API FH
6 152.400	4-1/2 in. X-Hole
6-1/4 158.800	4 1/2-in. API IF (NC-50)
8 203.200	6 5/8-in. API Reg.

Control Washer Bore (in./mm)	Burst Pressures for Circulation-Control Joint/ Rupture Disk Sub (PSI/bar)	
	Rupture Disk Thickness	
	0.010 in.	0.015 in.
1/2 12.700	2,850 196.5	4,300 296.5
9/16 14.288	2,200 151.7	3,600 248.2
5/8 15.875	2,000 137.9	2,700 186.2
11/16 17.463	1,700 117.2	2,500 172.4

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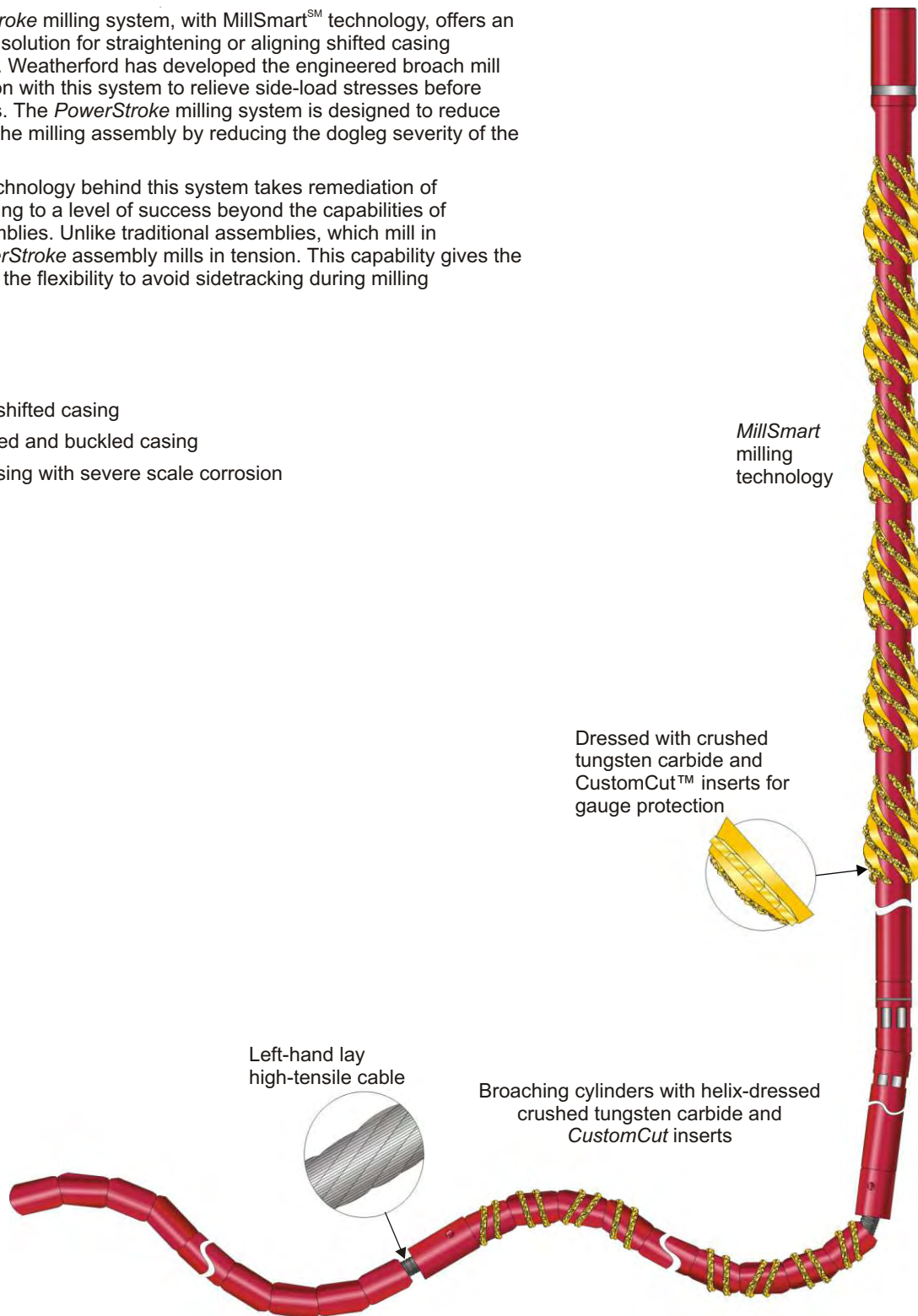
PowerStroke™ Milling System

Weatherford's *PowerStroke* milling system, with MillSmart™ technology, offers an innovative, cost-saving solution for straightening or aligning shifted casing sections in a single run. Weatherford has developed the engineered broach mill procedure for application with this system to relieve side-load stresses before rotational milling begins. The *PowerStroke* milling system is designed to reduce the fatigue stresses of the milling assembly by reducing the dogleg severity of the shifted wellbore path.

The next-generation technology behind this system takes remediation of subsidence-shifted casing to a level of success beyond the capabilities of traditional milling assemblies. Unlike traditional assemblies, which mill in compression, the *PowerStroke* assembly mills in tension. This capability gives the *PowerStroke* assembly the flexibility to avoid sidetracking during milling operations.

Applications

- Aligning subsidence-shifted casing
- Straightening collapsed and buckled casing
- Milling sections of casing with severe scale corrosion

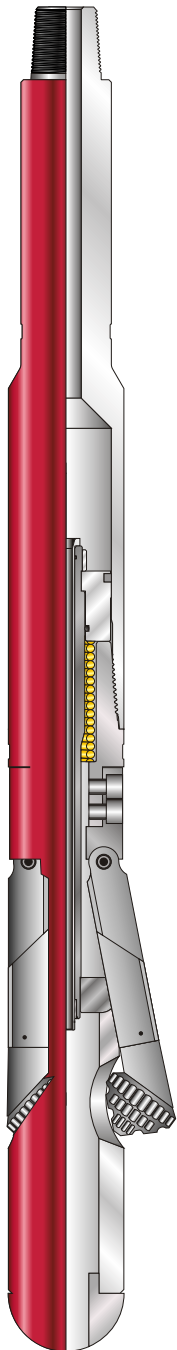


PowerStroke™ Milling System

Features, Advantages and Benefits

- System maintains communication between the upper and lower sections of the wellbore during milling, eliminating the risk of an unintentional sidetrack.
- System greatly reduces the dogleg severity of shifted wellbores, relieving fatigue stresses on the milling assembly components.
- Flexible weights and broaching section act as an internal guide for the milling assembly through the damaged casing section, preventing sidetracking from the wellbore and optimizing milling time.
- Modularity of the 30-ft flexible weight sections simplifies and economizes transport and eliminates the need for special handling equipment, making installation safer, simpler, and more efficient.
- Reciprocating, flexible broach milling assembly, with a combination right-hand/left-hand carbide helix, provides quick cutting action, considerably reducing milling time associated with conventional milling.
- The engineered free-rotating, 10° articulation swivel tool between the flexible broaching section and the milling assembly enables 360° movement. This capability allows the lower weight and broach section to remain stationary during milling, which minimizes assembly fatigue and casing damage below the dogleg.
- System is designed for single-run remediation for time and cost savings and restores the damaged wellbore to its maximum ID, optimizing completion remediation options.
- Variable-length broaching milling assembly minimizes the number of connections required and provides timesaving flexibility for long- or short-casing shift requirements.
- Left-hand lay cable facilitates right-hand rotation to prevent the tool from sticking. This advantage saves time and costs and eliminates a potential risk to the well.
- Integral stinger and milling assembly are designed for reduced fatigue stress failure on tool joint connection during milling operation.

A-1 Expandable Underreamer



Weatherford's A-1 expandable underreamer is exceptionally fast in opening a hole to provide clearance for running casing, to obtain adequate annular space for cementing, or to enlarge zones for gravel-pack completion. Rock-bit cones on the cutting arms make this simple, rugged tool highly effective.

Applications

- Enlarging hole size for casing cementing operations
- Enlarging zones for gravel packing
- Enlarging hole size for setting a cement plug in sidetrack operations

Features, Advantages and Benefits

- Simple design, with minimal parts and rugged construction, provide trouble-free operation.
- Hydraulic operation eliminates the need for a hard-bottom activation, enhancing operational efficiency.
- Built-in positive stop enables true gauge diameter.
- The ability to enlarge the hole as much as twice the tool diameter in medium or soft formations with one tool provides operational efficiency.
- The A-1 expandable underreamer allows full-volume circulation at all times for hole-cleaning capabilities.

Specifications

Casing OD (in./mm)	Tool OD (in./mm)	Opening Range (in./mm)
5-1/2 139.700	4-1/2 or 4-3/4 114.300 or 120.650	6 through 9-1/2 152.400 through 241.300
6-5/8 168.275	5-3/8 136.525	7 through 11 177.800 through 279.400
7 177.800	5-3/4 or 6 146.050 or 152.400	7 through 13 177.800 through 330.200
8-5/8 219.075	7-1/4 184.150	9-1/2 through 15 241.300 through 381.000
9-5/8 244.475	8-1/4 209.550	11 through 17 279.400 through 431.800
10-3/4 or 11-3/4 273.050 or 298.450	9-1/4 234.950	12 through 19 304.800 through 482.600
13-3/8 339.725	11-1/2 292.100	16 through 22 406.400 through 558.800
18-5/8 or 20 473.075 or 508.000	15 381.000	18 through 30 457.200 through 762.000
24 through 30 609.600 through 762.000	22 558.800	26 through 44 660.400 through 1,117.600

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Rotary Shoes

Weatherford's rotary shoes are used to wash over tubulars that have become sand stuck, mud stuck, or mechanically stuck and for milling over packers, retainers, and bridge plugs. Made of specially tempered steel and dressed with Weatherford's CustomCut™ tungsten carbide inserts and/or crushed tungsten carbide, rotary shoes provide the ultimate in strength, durability, cutting speed, and penetration rate. Rotary shoes are usually run on the bottom of one or more joints of washover pipe to cut clearance between the fish and the wall of the wellbore. Rotary shoe head designs are available in rough OD, for working in openhole wellbores, or smooth OD, for working in cased-hole wellbores. Rotary shoes can be ordered for any length, OD, and ID to meet job-specific requirements, and all come with Weatherford's MillSmartSM technology.

Applications

- Milling over blades from stabilizers, cutters from roller-type reamers, and cones from bits
- Washing over sand-stuck, mud-stuck, or mechanically stuck tubulars
- Milling over packers, retainers, and bridge plugs

Features, Advantages and Benefits

- Rugged construction provides optimal strength and durability for long equipment life.
- Smooth OD for cased-hole wellbores reduces risk of casing damage.
- Rough OD for openhole wellbores cuts clearance between the fish and the wall of the wellbore.
- Size range from 3 1/2- to 16-in. OD and shoe head style customization capability for milling on the bottom, on the OD, on the ID, or any combination of the three provide versatility for a variety of applications.
- Increased cutting speed and milling efficiency offer both cost and time savings.

Rotary Shoes

Types



Type A

Used in open hole and inside casing. Drag-tooth type shoe for soft formations or when running a weak work string. Cuts only on the bottom of the shoe.



Type D

Used in open hole for washing over and cutting metal and cement with limited inside clearance. Does not cut on the ID of the shoe. Cuts on the bottom and the OD of the shoe.



Type G

Used in open hole with limited outside clearance, for washing over a fish and cutting metal and a limited amount of cement. Because this type shoe does not cut on the ID of the shoe, it will not damage the fish. Cuts on the bottom and the OD of the shoe.



Type B

Used inside casing to wash over and cut on the bottom only. Because this type shoe does not cut on the ID or the OD of the shoe, it will not damage the casing. Cuts only on the bottom of the shoe.



Type E

Used in open hole for washing over and cutting metal, formation, or cement. Cuts on the bottom, the ID, and the OD of the shoe.



Type H

Used for sizing and dressing off the top of a fish inside casing. Makes a tapered cut on the fish without damaging the casing. Does not cut on the OD of the shoe. Cuts on the bottom and the ID of the shoe.



Type C

Used inside casing for cutting metal on a fish without damaging the casing. Does not cut on the OD of the shoe. Cuts on the bottom and the ID of the shoe.



Type F

Used inside casing to cut metal on a fish. Because this type shoe does not cut on the OD of the shoe, it will not damage the casing. Cuts on the bottom and the ID of the shoe.



Type I

Used in open hole for washing over and cutting the formation, metal, or cement with limited inside clearance. Cuts on the bottom, the ID, and the OD of the shoe.

Rotary Shoes

Types



Type J

Used inside casing for cutting metal on the fish. Because this type shoe does not cut on the OD of the shoe, it does not damage the casing. Cuts on the bottom and the ID of the shoe.



Type M

Used inside casing for washing over and cutting only on the bottom. Does not cut on the OD or the ID of the shoe. Cuts only on the bottom of the shoe.



Type K

Used in open hole for washing over and cutting formation only. Does not cut on the ID of the shoe. Cuts on the bottom and the OD of the shoe.

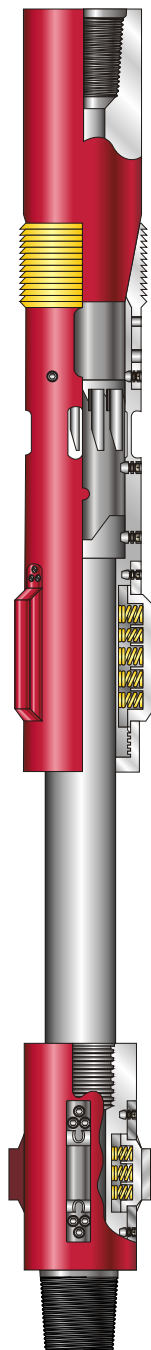


Type L

Used in open hole or inside casing for washing over and/or cutting formation only. Does not cut on the OD or the ID of the shoe. Cuts only on the bottom of the shoe.

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Washover Drill Collar Spear



Weatherford's washover drill collar spear is used when washing over drill collars and pipe that have become stuck off bottom to prevent their falling when they become free. The spear enables washover, back-off, and recovery operations to be accomplished in a single trip and eliminates the problem of stripping fish out of washpipe by allowing the fish to be positioned at the bottom of the washpipe string. If the fish falls free during washover operations, the spear automatically catches it, allowing the operation to continue.

Applications

- Catching and retrieving drill collars and pipe that have become stuck off bottom
- Recovering fish stuck on bottom, of a length requiring only one washover operation

Features

- Combines washover, back-off, and recovery operations in a single trip
- Withstands extreme pulling and shock loads imposed during fishing operations
- Requires only reciprocation and partial rotation to manipulate between set and release positions
- Can be screwed into, released, and lowered to the bottom of the washpipe at the surface, allowing handling of the washpipe independently of the fish

Benefits

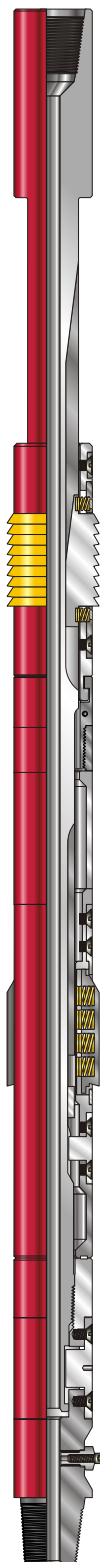
- Saves time and reduces number of trips
- Easy to operate
- Establishes a connection with the fish before washover operation begins
- Eliminates need to strip fish out of washpipe in any washover operation
- Reduces risk of losing fish during washover operations
- Eliminates fish and hole damage from dropped fish

Washover Drill Collar Spear

Specifications

Washover Size (in./mm)	Maximum OD (in./mm)	Minimum ID (in./mm)	Joint Connection (in.)
4-3/8 to 4-3/4 111.1 to 120.6	3-3/8 85.7	7/8 22.2	2-3/8 EUE
5 to 6 127.0 to 152.4	4-5/8 117.5	1-3/4 44.4	2-7/8 API IF
6-5/8 168.3	5-1/4 133.3	1-1/2 38.1	3-1/2 API IF
7 to 8-1/8 177.8 to 206.4	6-3/4 171.5	2 50.8	4-1/2 API FH
8-3/8 to 9-5/8 212.7 to 244.5	8-1/4 209.6	2-3/4 69.8	5-1/2 API Reg.
10-3/4 273.1	9-1/4 235.0	2-3/4 69.8	6-5/8 API Reg.
11-3/4 298.5	10-1/4 260.4	2-3/4 69.8	6-5/8 API Reg.

Weatherford® Washover Drill Collar Spear



The *Weatherford* washover drill collar spear saves time in washing over and retrieving a fish that is stuck off bottom, preventing it from falling when it becomes free. The washover spear is also effective in recovering a fish stuck on bottom when the length of the fish requires only one washover operation.

Applications

- Washover and retrieval of fish stuck off bottom
- Recovery of fish stuck on bottom when only a single washover operation is required

Features, Advantages and Benefits

- Single-trip washover and recovery capability saves time and can save washover and recovery costs. The spear can connect with the fish before the washover. By remaining in a catch position throughout the washover, the spear avoids dropping the fish to the bottom with the possibility of further fish damage or extensive wellbore damage.
- High-grade alloy steel construction and rigid manufacturing controls ensure strength and durability for working a stuck fish correctly or for using a string shot to back off the washed-over portion of a fish when a complete fish cannot be recovered.
- Recovery of the washed-over portion of the fish with the wash pipe saves one complete trip with the fishing string (and associated costs). When the pipe is brought to the surface, the spear can be screwed into, released, and lowered to the bottom of the washover string. Handling the pipe and the fish separately prevents the slow stripping of the fish from the pipe.

Specifications

Part No.	OD (in./mm)	ID (in./mm)	Upper Connection (in.)	Slip Catch Range (in./mm)
353-805	3-15/16 100.0	7/8 22.2	2-3/8 API IF	4.198 to 4.990 106.6 to 126.7
353-810	5-3/4 146.1	1-7/8 47.6	4-1/2 API FH	6.184 to 7.825 157.1 to 198.8
353-815	7-3/8 187.3	2 50.8	4-1/2 API FH	7.825 to 10.000 198.8 to 254.0

Weatherford® Washover Back-Off Connector (WOBO™ Tool)

The Weatherford washover back-off connector is designed to increase the recovery rate of stuck drill collars, drillpipe, or tubing in washovers. The back-off connector enables the operator to wash over the stuck fish, perform free-point and back-off operations, and recover the fish in a single trip. If the fish length requires multiple washovers and back-offs, complete removal of the washover assembly from the hole is unnecessary.

Applications

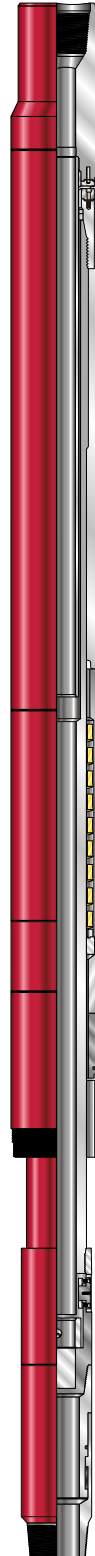
- Washover and recovery of any length of stuck drill collars, drillpipe, or tubing

Features, Advantages and Benefits

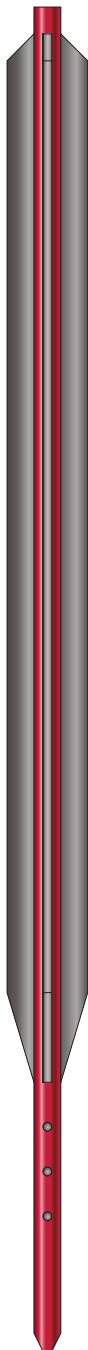
- Two safety joints—a Weatherford washover back-off safety joint for backing off the washpipe string and a Weatherford J-type safety joint for backing off the fishing string from the fish—save rig time and costs of additional wireline runs.
- Design enables washover pipe rotation independent of the fish, preventing washover pipe sticking.
- The washover back-off connector washes over and recovers in one trip, saving rig time.

Specifications

Part No.	OD (in./mm)	ID (in./mm)	Minimum Size Casing to Run	Upper Box Connection (in.)	Lower Pin Connection (in.)	Washover Pipe Connection (Pin)
352-505	4 101.6	1-5/8 41.3	5 1/2-in. 23 lb/ft	2-3/8 API IF	2-3/8 EUE 8RF	4-in., 14 lb/ft Hydraulic FJ WP
352-510	5-3/8 136.5	1-5/8 41.3	6 5/8-in. 24 lb/ft	2-7/8 API IF	2-7/8 API IF	5-in. X-Line
352-515	7-3/16 182.6	2 50.8	8 5/8-in. 28 lb/ft	4-1/2 API FH	4-1/2 API FH	7-in. X-Line



Aluminum Casing Alignment Tool



The aluminum casing alignment tool is used to repair wellbore casings where the casing string has parted and shifted out of place or where extensive milling operations have cut through casing and left a gap of weak pipe or no casing at all. The tool has a simple, but rugged, design—aluminum blades welded to an aluminum body.

The aluminum casing alignment tool is run on the bottom of a cement retainer; the bladed section of the tool overlaps the damaged section of casing. The cement retainer is set, the cementing operation is completed, a junk mill is used to mill the cement retainer, and a specially dressed rotary shoe is used to wash over the casing alignment tool. An overshot is used to recover any parts of the tool that are not recovered in the washover operation.

Features, Advantages and Benefits

- Rugged, simple construction provides a reliable, durable tool.
- Each section and overlapping blades are welded together for strength.
- The tool can be built and assembled to any size and length to suit job-specific requirements.

Construction

The aluminum casing alignment tool is not carried as a warehouse stock item; rather, it is manufactured in 12-ft (3.7-m) sections and can be built to any size and length for the job. Each section is machined to the drift diameter of the size and weight of the casing in which it will be run. Threaded connections are used to assemble the sections, with the blades of one section overlapping the next section. For strength, each section and overlapping blades are then welded together to complete the finished tool. The standard assembled tool is 24 ft (7.3 m) long, with 18 in. (457 mm) of fishing neck at the top and 18 in. (457 mm) of tapered nose at the bottom. The stabilizing and aligning blades are 21 ft (6.4 m) long.

Casing Bowl Patch

Weatherford's casing bowl patch allows permanent, leak-proof repairs to damaged casing strings without removal of the entire string from the hole. With a lead or rubber sealing element, the casing bowl patch is lowered into the hole on the end of the replacement string. Like an overshot, the patch then engages the casing remaining in the hole.

Applications

- The casing bowl patch provides an economical means of repairing casing string defects caused by leaks or other damage.

Features, Advantages and Benefits

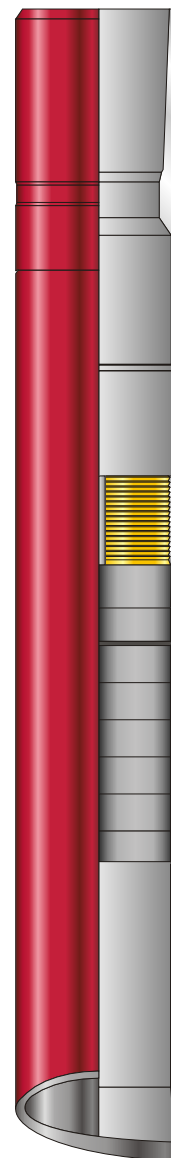
- The casing bowl patch arrives at the work site ready for installation to save rig time.
- High-grade alloy steel construction provides durability and strength.

Specifications

Size of Tubing or Casing to Be Patched	Casing Bowl OD		Minimum Size of Casing to Be Run Into	
			OD	Weight
(in.)	(in.)	(mm)	(in.)	(lb/ft)
2-7/8	3-7/8	98.425	4-1/2	9.5
4-1/2	5-5/8	142.875	6-5/8	24.0
5	5-15/16	150.813	7-5/8	39.0
	6-1/4	158.750		
5-1/2	6-5/8	168.275	7-5/8	29.7
	7-1/4	184.150	8-5/8	39.0
6	7-1/4	184.150	8-5/8	49.0
	8	203.200	9-5/8	53.5
6-5/8	7-5/8	193.675	8-5/8	36.0
	8-1/4	209.550	9-5/8	53.5
7	8-1/4	209.550	9-5/8	53.5
	8-7/8	225.425	10-3/4	65.7
7-5/8	9-3/8	238.125	10-3/4	60.7
	10-1/4	260.350	11-3/4	60.0
8-5/8	9-11/16	246.063	10-3/4	45.5
	10-1/4	260.350	11-3/4	60.0
9-5/8	11-1/2	292.100	13-3/8	72.0
10-3/4	12-1/8	307.975	13-3/8	72.0
11-3/4	13-3/4	349.250	16	84.0
13-3/8	14-3/4	374.650	16	84.0

Options

- Rubber sealing elements are standard; lead sealing elements are available on request.



HOMCO® Internal Steel Liner Casing Patch



Designed to seal perforations, collar and thread leaks, splits and limited corroded areas in tubing and casing and to provide added protection during squeeze jobs, the *HOMCO* internal steel liner casing patch is as versatile as it is effective to any depth.

The *HOMCO* patch has repeatedly sealed leaks and perforations where cementing efforts have failed, including in production wells, wells that must be deepened after patching and disposal storage wells. The patch is permanent yet can be removed from the wellbore by milling.

Features, Advantages and Benefits

The *HOMCO* internal steel liner casing patch is recognized worldwide as a cost-effective casing remediation system. Using special setting tools and techniques skilled Weatherford personnel have installed more than 10,000 patches to date.

The *HOMCO* patch offers significant advantages over other sealing methods.

Speed

- Repairs are made quickly. Total setting time is limited only by roundtrip time.
- Operations can be resumed as soon as the setting tool is pulled and the patch pressure-tested.

Reliability

- Steel makes the seal and is resistant to cracking and crumbling. An epoxy resin, spread on a fiberglass mat covering the outside diameter of the steel liner, is extruded into leaks and cavities in the casing wall and acts as a gasket and secondary sealing agent.
- The setting tool is designed for twice the normal operating pressure.

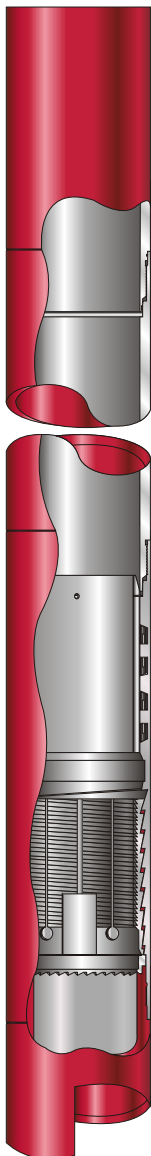
Versatility

- The casing patch is available in 20-ft (6.1-m) lengths, which can be made up to several hundred feet.
- Weatherford has a complete line of tools and patches for more than 60 different sizes and weights of tubing and casing between 2-7/8 and 26 in.
- The casing patch is available worldwide through all Weatherford service locations.
- Thick (1/8-in.) liners are available for normal patching operations. A new, heavier-wall liner has been developed and successfully used and is now available for higher-pressure operations. Also available on request are a special liner material for highly corrosive conditions and a material for high-temperature wells (600°F/316°C).
- Patches can be run through and set below, previously installed patches of the same type.

Installation of the *HOMCO* internal steel liner casing patch is done only by qualified Weatherford personnel using special setting tools and techniques.

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Deepwater High-Pressure Underwater Wellhead Casing Patch



The Weatherford deepwater high-pressure underwater wellhead casing patch is a packer-type patch for casing of all sizes and weights. Rated for 12,000-psi working pressure, the patch becomes a permanent part of the repaired casing string. The casing patch can be run with one or both of its two 5-ft alloy steel extensions, depending on client requirements.

Applications

- Repair of damaged casing string of all sizes and weights

Features

- Four Type L packers, each with a KEVLAR® inner ring onto which nitrile rubber is molded, are inverted to seal in both directions packers are tested to 20,000 psi without damage.
- Packer protector fully covers packers for protection when engaging casing into the patch.
- Protector is secured by shear pins, which shear at casing contact with the protector.
- Longer-than-standard basket grapple engages more of the casing.
- Mill control packer included for milling off burrs from outside of the casing.

Benefits

- Versatile design enables patching casing of any size or weight.
- Longer basket grapple provides additional pull load.
- Overshot-type design allows release, if required.

Options

- Rubber sealing elements are standard; lead sealing elements are available on request.
- Optional 5-ft lower extension is available.

KEVLAR is a registered trademark of E.I. duPont de Nemours Company.

Deepwater High-Pressure Underwater Wellhead Casing Patch

Specifications

To Patch Casing Sizes (in./mm)	Patch OD 12K WP (in./mm)	Catch Ranges of Patch Grapples			Torque to Yield 12,000 PSI Service		
		Minimum (in./mm)	Nominal (in./mm)	Maximum (in./mm)	Guide to Bowl (lb/ft, N•m)	Bowl to Extensions (lb/ft, N•m)	Extensions to Top Sub (lb/ft, N•m)
9-5/8 244.5	11.625 295.3	9.577 243.3	9.625 244.5	9.721 246.9	(P) 31,600 42,844	(P) 121,800 165,139	
9-7/8 250.8	11.750 298.5	9.826 249.6	9.875 250.8	9.974 253.3	(P) 30,600 41,488	(B) 128,400 174,087	
10-3/4 273.1	12.875 327.0	10.696 271.7	10.750 273.1	10.858 275.8	(P) 26,800 36,336	(P) 166,600 225,880	
11-3/4 298.5	14.250 362.0	11.691 297.0	11.750 298.5	11.868 301.4	(P) 51,400 69,689	(P) 240,000 325,397	
11-7/8 301.6	14.250 362.0	11.816 300.1	11.875 301.6	11.994 304.6	(P) 51,400 69,689	(P) 240,000 325,397	
13-3/8 339.7	15.750 400.1	13.308 338.0	13.375 339.7	13.509 343.1	(P) 69,200 93,823	(P) 286,000 387,765	
13-5/8 346.1	16.125 409.6	13.557 344.3	13.625 346.1	13.761 349.5	(P) 67,400 91,382	(B) 270,000 366,071	

Note: Torque all Weatherford Casing Patch joints equal to casing torque. **P** indicates the pin as the weaker, **B** indicates the box as the weaker. Exceptionally high make-up torque is not required on the joints.

Deepwater High-Pressure, Gas-Tight, Underwater Wellhead Casing Patch



Weatherford's deepwater high-pressure, gas-tight, underwater wellhead casing patch is an elastomer seal patch for casing and tubing of all sizes and weights. Rated according to specifications to the appropriate pressure, the casing patch becomes a permanent part of the repaired casing string. The casing patch can be run with one or both of its two 5-ft alloy steel extensions, depending on application requirements.

Features, Advantages and Benefits

- Eight proprietary elastomer seal elements tested to 9,000 PSI (62,053 kPa) at 250°F (121°C) make this casing patch suitable for gas environments.
- Packer protector sleeve fully covers packers for protection when engaging casing or tubing into the patch.
- Packer protector sleeve is secured by shear pins, rated at 2,220 lb (1,007 kg), which shear on contact with the casing and tubing to prevent debris from entering the seal area before the tubular to be engaged enters the patch.
- Longer-than-standard basket grapple engages more of the casing or tubing and provides additional pull load for greater efficiency.
- Mill control packer is included for milling burrs from the outside of the casing or tubing to prevent damage to the seals when the tubular enters the patch.
- Versatile design and optional 5-ft lower extension enable patching of casing or tubing of any size or weight.
- Overshot-type design allows easy release, if necessary, from the tubular downhole, eliminating the need for an extra trip to cut below the patch.

Specifications

To Patch Casing Sizes (in./mm)	Patch OD (in./mm)	Catch Range of Patch Grapples			Working Pressure (PSI/kPa)
		Minimum (in./mm)	Nominal (in./mm)	Maximum (in./mm)	
4-1/2 114.3	5-7/8 149.2	4.45 113.0	4.5 114.3	4.59 116.6	9,000 62,053

Wireline Stripping Assembly

Weatherford's wireline stripping assembly is used when wireline tools such as radioactive logging tools, still attached to the wireline at the surface, become stuck in a wellbore. Wireline stripping is the preferred method for recovery of radioactive logging tools in directionally drilled wellbores, in wireline-stuck situations, in open hole, and in logging tool depths of 3,000 ft (914 m) or greater.

Each wireline stripping assembly comes complete with all the specialty tools and accessories required for stripping over and retrieving wireline tools while the tools are still attached to the wireline at the surface. The assembly minimizes rig time required for conventional fishing of parted wireline and logging tools.

Applications

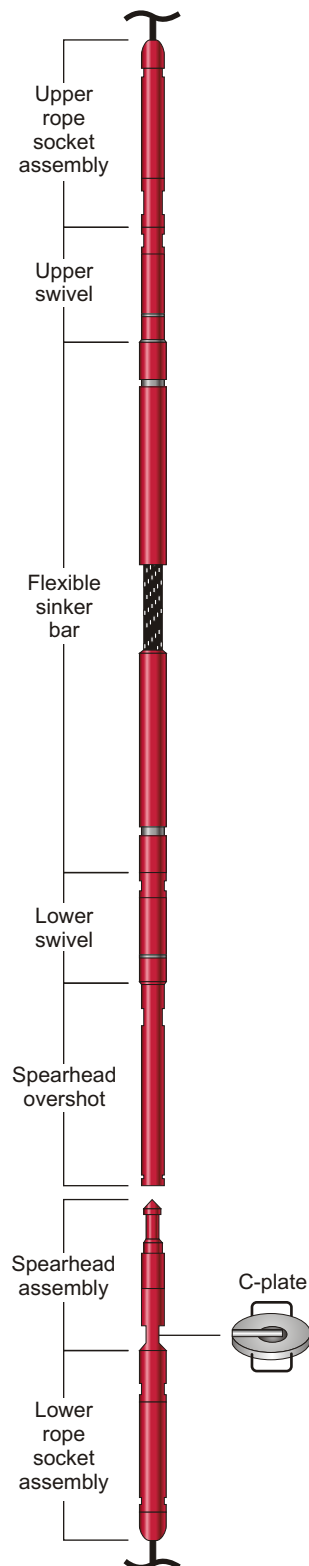
- Retrieval of stuck wireline tools that are still attached to the wireline at the surface

Features, Advantages and Benefits

- The wireline stripping assembly minimizes rig time required for conventional fishing of parted wireline and logging tools.
- All specialty tools and accessories are included with the assembly to ensure reliable performance and fishing success.

Options

- Flexible sinker bars are available for safer and more efficient operations on rigs with top-drive systems.



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